ВОПРОСЫ И ОТВЕТЫ НА ВОЗМОЖНЫЕ ДОПОЛНИТЕЛЬНЫЕ ВОПРОСЫ ОТ ЯРЧЕНКО ПРИ ТРУДОУСТРОЙСТВЕ В АФЛ.

SkyWay AVIATION ENGLISH

SkyWay

1) Airfoil chord line, Mean chord line, mean camber line, angel of attack, angel of incidence, washout, dihedral

Airfoil chord line - is a straight line from the leading edge to the trailing edge of an aerofoil.

Mean chord line - is the wing area divided by the wing span (sometimes referred to as the standard mean chord).

Mean camber line - is a line from the leading edge to the trailing edge of equidistance on the upper and lower surfaces of an aerofoil.

Angel of attack - is the angle between the chord line of an aerofoil and the relative airflow.

Angel of incidence - is the angle between the aerofoil's chord line and the aircraft's longitudinal datum. It is a fixed angle for a wing but may be variable for a tailplane. (It is sometimes called rigging incidence.)

Washout - is a decrease in the angle of incidence from the wing root to the tip. This compensates for the early stall due to the higher levels of loading experienced at the wing tips. The root will tend to stall first.

Dihedral - is the upward inclination of a wing from the root to the tip. The angle between the horizontal datum of an aeroplane and the plane of a wing.

2) Dynamic (positive, negative, neutral)/Static (positive, negative, neutral) stability

Stability is the inherent quality of an aircraft to correct for conditions that may disturb its equilibrium, and to return to or to continue on the original flightpath.

Dynamic stability refers to the aircraft response over time when disturbed from a given AOA, slip, or bank. This type of stability also has three subtypes:

• Positive dynamic stability—over time, the motion of the displaced object decreases in amplitude and, because it is positive, the object displaced returns toward the equilibrium state.

• Neutral dynamic stability—once displaced, the displaced object neither decreases nor increases in amplitude. A worn automobile shock absorber exhibits this tendency.

• Negative dynamic stability—over time, the motion of the displaced object increases and becomes more divergent.

Static stability refers to the initial tendency, or direction of movement, back to equilibrium. In aviation, it refers to the aircraft's initial response when disturbed from a given AOA, slip, or bank.

• Positive static stability—the initial tendency of the aircraft to return to the original state of equilibrium after being disturbed

• Neutral static stability—the initial tendency of the aircraft to remain in a new condition after its equilibrium has been disturbed

• Negative static stability—the initial tendency of the aircraft to continue away from the original state of equilibrium after being disturbed

3) Tree axes

The longitudinal axis passes through the CG from nose to tail. A moment about this axis is a rolling moment, L, a roll to the right is a positive rolling moment.

The normal (vertical) axis passes vertically through the CG at 90° to the longitudinal axis. A moment about the normal axis is a yawing moment, N, and a positive yawing moment would yaw the aircraft to the right.

The lateral axis is a line passing through the CG, parallel to a line passing through the wing tips. A moment about the lateral axis is a pitching moment, M, and a positive pitching moment is nose up.

4) 4 силы

Weight—the combined load of the aircraft itself, the crew, the fuel, and the cargo or baggage. Weight pulls the aircraft downward because of the force of gravity. It opposes lift, and acts vertically downward through the aircraft's center of gravity (CG).

Lift—opposes the downward force of weight, is produced by the dynamic effect of the air acting on the airfoil, and acts perpendicular to the flightpath through the center of lift. Lift is defined as the net force generated normal (at 90°) to the relative airflow or flight path of the aircraft. The aerodynamic force of lift results from the pressure differential between the top and bottom surfaces of the wing.

Drag—is the force which resists the forward motion of the aircraft. Drag acts parallel to and in the same direction as the relative airflow (in the opposite direction to the flight path).

Thrust—the forward force produced by the powerplant/propeller or rotor. It opposes or overcomes the force of drag. As a general rule, it acts parallel to the longitudinal axis.

5) Longitudinal/ lateral/ directional stability

Directional (vertical) stability is the tendency for an aircraft to regain its direction (heading) after the aircraft has been directionally disturbed (e.g., an induced yaw) from its straight path. This is achieved naturally because the fin (vertical tailplane) becomes presented to the airflow at a greater angle of incidence, which generates a restoring aerodynamic force. Directional stability is about the normal axis (yawing). The area of the vertical fin and the sides of the fuselage aft of the CG are the prime contributors which make the aircraft act like the well known weather vane or arrow, pointing its nose into the relative wind.

Lateral stability is the tendency for an aircraft to return to a laterally level position around the longitudinal axis on release of the ailerons in a sideslip. lateral stability is about the longitudinal axis (rolling). The most common procedure for producing lateral stability is to build the wings with an angle of one to three degrees above perpendicular to the longitudinal axis. The wings on either side of the aircraft join the fuselage to form a slight V or angle called "dihedral." The amount of dihedral is measured by the angle made by each wing above a line parallel to the lateral axis.

Longitudinal stability is an aircraft's natural ability to return to a stable pitch position around its lateral axis after a disturbance. Longitudinal stability is about the lateral axis (pitching). To obtain static longitudinal stability, the relation of the wing and tail moments must be such that, if the moments are initially balanced and the aircraft is suddenly nose up, the wing moments and tail moments change so that the sum of their forces provides an unbalanced but restoring moment which, in turn, brings the nose down again.

6). Управляемость

The term controllability refers to the ability of the aircraft to respond to control surface displacement and achieve the desired condition of flight. A contradiction exists between stability and controllability. A high degree of stability gives reduced controllability.

Controllability—the capability of an aircraft to respond to the pilot's control, especially with regard to flightpath and attitude. It is the quality of the aircraft's response to the pilot's control application when maneuvering the aircraft, regardless of its stability characteristics.

7). Центр давления

Center of pressure. A point along the wing chord line where lift is considered to be concentrated. For this reason, the center of pressure is commonly referred to as the center of lift.

Centre of Pressure (CP): The point on the chord line, through which Lift is considered to act.

Chord Line: A straight line joining the centres of curvature of the leading and trailing edges of an aerofoil.

Mean Line or Camber Line: A line joining the leading and trailing edges of an aerofoil, equidistant from the upper and lower surfaces.

8). Центр тяжести

Center of gravity (CG). The point at which an airplane would balance if it were possible to suspend it at that point. It is the mass center of the airplane, or the theoretical point at which the entire weight of the airplane is assumed to be concentrated. It may be expressed in inches from the reference datum, or in percentage of mean aerodynamic chord (MAC). The location depends on the distribution of weight in the airplane.

Mean aerodynamic chord (MAC). The average distance from the leading edge to the trailing edge of the wing.

The center of gravity (C of G, CG) is the point through which the total weight of a body will act.

Mean Aerodynamic Chord (MAC): The chord drawn through the geographic centre of the plan area. A rectangular wing of this chord and the same span would have broadly similar pitching moment characteristics. The MAC is located on the reference axis of the aircraft and is a primary reference for longitudinal stability considerations.

Mean chord line - is the wing area divided by the wing span (sometimes referred to as the standard mean chord).

9). Centre of gravity limit

Center of gravity limits. The specified forward and aft points within which the CG must be located during flight. These limits are indicated on pertinent airplane specifications.

The center of gravity range relates to the furthest forward and aft center of gravity positions along the aircraft's longitudinal axis, inside which the aircraft is permitted to fly. This is so because the horizontal tailplane can generate a sufficient lift force to balance the aircraft's lift-weight moment couple so that it remains longitudinally stable and retains a manageable pitch control.

The forward position of the center of gravity is limited to:

- Ensure that the aircraft is not too nose heavy so that the horizontal tailplane has a sufficient turning moment available to overcome its natural longitudinal stability.

The aft position of the center of gravity is limited to:

- Ensure that the aircraft is not too tail heavy so that the horizontal tailplane has a sufficient turning moment available to make the aircraft longitudinally stable.

10). Точка стагнации

Stagnation point - A point where streamlines are divided by a body and where the fluid speed is zero, relative to the surface.

A stagnation point exists where the air stream impacts (impinges) on the front of the airfoil's surface and splits; some air goes over and some under. Another stagnation point exists at “B,” where the two airstreams rejoin and resume at identical velocities.

The greatest positive pressure occurs at the stagnation point where the relative flow velocity is zero. This stagnation point is located somewhere near the leading edge. As the angle of attack increases from -4° the leading edge stagnation point moves from the upper surface around the leading edge to the lower surface. It is at the front stagnation point where the flow divides to pass over and under the section. The pressure at the stagnation point is Static + Dynamic.

11). Фокус крыла

Aerodynamic centre (AC) – is a stationary point on the chord line about which pitching moment remains constant.

Pitching moment about the AC does not change with changes in angle of attack.

The changes in magnitude of lift force due to changes in angle of attack, acting through the aerodynamic centre (AC).

12). Как изменяется управляемость и устойчивость самолета при изменении положения Центра Тяжести.

If CoG moves forward stability increases and controllability decreases. If CoG moves rearward stability decreases and controllability increases.

13). Yaw, Roll, Pitch, Dutch Roll, Spiral stability, sweep back, Keel effect (и всегда следует – Could you explain)

The three motions of the conventional airplane (roll, pitch, and yaw) are controlled by three control surfaces. Roll is controlled by the ailerons; pitch is controlled by the elevators; yaw is controlled by the rudder.

Yaw is a motion about the normal axis (directional control).

Pitch is a motion about the lateral axis (longitudinal control).

Roll is a motion about the longitudinal axis (lateral control).

Dutch roll is a coupled lateral/directional oscillation that is usually dynamically stable but is unsafe in an aircraft because of the oscillatory nature.

Dutch roll is an oscillatory instability associated with swept-wing jet aircraft. It is the combination of yawing and rolling motions. When the aircraft yaws, it will develop into a roll. The yaw itself is not too significant, but the roll is much more noticeable and unstable. This is so because the aircraft suffers from a continuous reversing rolling action.

An aircraft with strong “dihedral effect” and weak directional stability will have a tendency towards dutch roll instability.

Too much static lateral stability could result in dynamic instability - Dutch Roll.

Dutch roll will occur when the “dihedral effect” is large when compared to static directional stability.

Spiral stability (or a spirally stable aircraft) is defined as the tendency of an aircraft in a properly coordinated banked turn to return to a laterally level flight attitude on release of the ailerons. Spirally stable aircraft have dominant lateral surfaces (e.g., wings).

Spiral instability or a spirally unstable aircraft will see a banked turn increase fairly quickly, followed by the nose falling into the turn, leading to the aircraft entering into a spiral dive when the ailerons are released in a coordinated turn. Spirally unstable aircraft have dominant (too large) vertical surfaces (e.g., tailplane). What happens is th at as the aircraft starts to slip into the turn on release of the ailerons and before the rolling moment due to the sideslip can take effect, the rather dominant fin jumps into play. This is so because the fin /tailplane area (outside) becomes exposed to the relative airflow, which exerts two forces on the aircraft:

1. Around the vertical axis, which straightens the aircraft directionally

2. A round the longitudinal axis, which increases the bank

This accelerates the outer (upper) wing and causes the bank to be increased further. The increased bank causes another slip, which the fin again straightens. This sequence repeats, and the turn is thus made steeper. Once the bank angle exceeds a given type-specific amount (say, 30°), the nose falls into the turn, the speed increases as the roll increases, and the aircraft enters into a spiral dive.

Spiral instability exists when the static directional stability of the aircraft is very strong as compared to the effect of its dihedral in maintaining lateral equilibrium. When the lateral equilibrium of the aircraft is disturbed by a gust of air and a sideslip is introduced, the strong directional stability tends to yaw the nose into the resultant relative wind while the comparatively weak dihedral fails in restoring the lateral balance. Due to this yaw, the wing on the outside of the turning moment travels forward faster than the inside wing and, as a consequence, its lift becomes greater. This produces an overbanking tendency which, if not corrected by the pilot, results in the bank angle becoming steeper and steeper. At the same time, the strong directional stability that yaws the aircraft into the relative wind is actually forcing the nose to a lower pitch attitude. A slow downward spiral begins which, if not counteracted by the pilot, gradually increases into a steep spiral dive. Usually the rate of divergence in the spiral motion is so gradual the pilot can control the tendency without any difficulty.

Sweepback is an addition to the dihedral that increases the lift created when a wing drops from the level position. A sweptback wing is one in which the leading edge slopes backward. When a disturbance causes an aircraft with sweepback to slip or drop a wing, the low wing presents its leading edge at an angle that is perpendicular to the relative airflow. As a result, the low wing acquires more lift, rises, and the aircraft is restored to its original flight attitude.

Sweepback also contributes to directional stability. When turbulence or rudder application causes the aircraft to yaw to one side, the right wing presents a longer leading edge perpendicular to the relative airflow. The airspeed of the right wing increases and it acquires more drag than the left wing. The additional drag on the right wing pulls it back, turning the aircraft back to its original path.

Keel effect. An aircraft always has the tendency to turn the longitudinal axis of the aircraft into the relative wind. This "weather vane" tendency is similar to the keel of a ship and exerts a steadying influence on the aircraft laterally about the longitudinal axis. When the aircraft is disturbed and one wing dips, the fuselage weight acts like a pendulum returning the airplane to its original attitude. Laterally stable aircraft are constructed so that the greater portion of the keel area is above and behind the CG. [Figure 4-26] Thus, when the aircraft slips to one side, the combination of the aircraft's weight and the pressure of the airflow against the upper portion of the keel area (both acting about the CG) tends to roll the aircraft back to wings-level flight.

14). з-н Бернули, 3-закона Ньютона, магнетизм Земли (ну и стандартно Could you explain)

Static pressure is the result of the weight of the atmosphere pressing down on the air beneath. Static pressure will exert the same force per square metre on all surfaces of an aeroplane. The lower the altitude the greater the force per square metre.

Dynamic pressure is the pressure of the air molecules impacting onto a surface caused by either the movement of a body (e.g., an aircraft) through the air or the air flowing over a stationary object.

Bernoulli's Principle states that as the velocity of a moving fluid (liquid or gas) increases, the pressure within the fluid decreases.

"In the steady flow of an ideal fluid the sum of the pressure and kinetic energy per unit volume remains constant".

This statement can be expressed as: Pressure + Kinetic energy = Constant or: $p + 1/2\ \rho\ V2$

Newton’s First Law: “Every object persists in its state of rest or uniform motion in a straight line unless it is compelled to change that state by forces impressed on it.”

This means that nothing starts or stops moving until some outside force causes it to do so. An aircraft at rest on the ramp remains at rest unless a force strong enough to overcome its inertia is applied. Once it is moving, its inertia keeps it moving, subject to the various other forces acting on it. These forces may add to its motion, slow it down, or change its direction.

Newton’s Second Law: “Force is equal to the change in momentum per change in time. For a constant mass, force equals mass times acceleration.”

When a body is acted upon by a constant force, its resulting acceleration is inversely proportional to the mass of the body and is directly proportional to the applied force. This takes into account the factors involved in overcoming Newton’s First Law. It covers both changes in direction and speed, including starting up from rest (positive acceleration) and coming to a stop (negative acceleration or deceleration).

Newton’s Third Law: “For every action, there is an equal and opposite reaction.”

In an airplane, the propeller moves and pushes back the air; consequently, the air pushes the propeller (and thus the airplane) in the opposite direction—forward. In a jet airplane, the engine pushes a blast of hot gases backward; the force of equal and opposite reaction pushes against the engine and forces the airplane forward.

Magnus effect. Lifting force produced when a rotating cylinder produces a pressure differential. This is the same effect that makes a baseball curve or a golf ball slice.

15). Flight Instruments and Controls Your aircraft

PFD

16). Stall (сваливание) и процедуры по выводу из сваливания

An aircraft stall results from a rapid decrease in lift caused by the separation of airflow from the wing’s surface brought on by exceeding the critical AOA.

An aircraft stalls when the streamlined/laminar airflow (or boundary layer) over the wing’s upper surface, which reduces lift, breaks away from the surface when the critical angle of attack is exceeded, irrespective of airspeed, and becomes turbulent, causing a loss in lift (i.e., the turbulent air on the upper surface creates a higher air pressure than on the lower surface). The only way to recover is to decrease the angle of attack (i.e., relax the backpressure and/or move the control column forward).

When a lift coefficient increases up to a maximum lift coefficient (CLmax), and suddenly decreases when the angle of attack is increased above a certain value. This phenomenon is called a stall.

17). Принцип работы указателя скорости и высотомера (Рассказать про Полное Аэродинамическое давление и Статическое давление)

Static pressure is the result of the weight of the atmosphere pressing down on the air beneath. Static pressure will exert the same force per square metre on all surfaces of an aeroplane. The lower the altitude the greater the force per square metre.

Dynamic pressure is the pressure of the air molecules impacting onto a surface caused by either the movement of a body (e.g., an aircraft) through the air or the air flowing over a stationary object.

The altimeter is an instrument that measures the height of an aircraft above a given pressure level. The pressure altimeter is an aneroid barometer that measures the pressure of the atmosphere at the level where the altimeter is located, and presents an altitude indication in feet. The altimeter uses static pressure as its source of operation. A stack of sealed aneroid boxes comprise the main component of the altimeter. An aneroid box is a sealed box that is evacuated to an internal pressure of 29.92 inches of mercury (29.92 "Hg). These boxes are free to expand and contract with changes to the static pressure. A higher static pressure presses down on the boxes and causes them to collapse. A lower static pressure (less than 29.92 "Hg) allows the boxes to expand. A mechanical linkage connects the box movement to the needles on the indicator face, which translates compression of the boxes into a decrease in altitude and translates an expansion of the boxes into an increase in altitude.

The VSI, which is sometimes called a vertical velocity indicator (VVI), indicates whether the aircraft is climbing, descending, or in level flight. Although the VSI operates solely from static pressure, it is a differential pressure instrument. It contains a diaphragm with connecting linkage and gearing to the indicator pointer inside an airtight case. The inside of the diaphragm is connected directly to the static line of the pitot-static system. The area outside the diaphragm, which is inside the instrument case, is also connected to the static line, but through a restricted orifice (calibrated leak). Both the diaphragm and the case receive air from the static line at existing atmospheric pressure. The diaphragm receives unrestricted air while the case receives the static pressure via the metered leak. When the aircraft is on the ground or in level flight, the pressures inside the diaphragm and the instrument case are equal and the pointer is at the zero indication. When the aircraft climbs or descends, the pressure inside the diaphragm changes immediately, but due to the metering action of the restricted passage, the case pressure remains higher or lower for a short time, causing the diaphragm to contract or expand. This causes a pressure differential that is indicated on the instrument needle as a climb or descent.

The Air Speed Indicator is a pressure gauge. In principle, the simple ASI can be considered as an airtight box divided by a flexible diaphragm, with pitot pressure fed to one side and static pressure to the other side.

The ASI measures dynamic pressure as the difference between the total pitot pressure measured in the instrument's capsule/diaphragm and the static pressure measured in the case. The dynamic pressure represents the indicated airspeed (IAS) as knots per hour.

Attitude indicator.

A gyroscope is a body (usually a rotor/wheel) rotating freely in one or more directions that possesses the gyroscopic properties of rigidity and precession.

18). отличие VFR от IFR

Visual flight rules (VFR). Flight rules governing aircraft flight using visual references. VFR operations specify the amount of ceiling and the visibility the pilot must have in order to operate according to these rules. When the weather conditions are such that the pilot can not operate according to VFR, he or she must use instrument flight rules (IFR).

Instrument flight rules (IFR). Rules and regulations governing flight under conditions in which flight by outside visual reference is not safe. IFR flight depends upon flying by reference to instruments in the flight deck, and navigation is accomplished by reference to electronic signals.

IFR involves: Air traffic management, separation by ATC

19). отличие IMC от VMC

Visual meteorological conditions (VMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling meeting or exceeding the minimums specified for VFR.

Instrument meteorological conditions (IMC). Meteorological conditions expressed in terms of visibility, distance from clouds, and ceiling less than the minimums specified for visual meteorological conditions, requiring operations to be conducted under IFR.

20). Отличие Visual App от Circle-to-land

VA is flown only by visual reference. Circle-to-land involves instrument approach to one runway then visual maneuvering to land on another runway.

21). что такое Side step maneuvering

A sidestep is a visual maneuver to land on an adjacent parallel runway. For example when you perform ILS approach to RW 04 R then having established visual contact change RW to 04 L and perform landing visualy.

22). число M, IAS, TAS

Indicated airspeed (IAS) is a measure of dynamic pressure translated to a speed and displayed to the pilot on the airspeed indicator (ASI) usually as knots per hour.

Indicated Air Speed: (IAS). The speed registered on the Air Speed Indicator.

Indicated airspeed (IAS)—the direct instrument reading obtained from the ASI, uncorrected for variations in atmospheric density, installation error, or instrument error. Manufacturers use this airspeed as the basis for determining aircraft performance. Takeoff, landing, and stall speeds listed in the AFM/ POH are IAS and do not normally vary with altitude or temperature.

Calibrated airspeed (CAS)—IAS corrected for installation/position/pressure error and instrument error.

Equivalent airspeed (EAS) is Calibrated airspeed (CAS) corrected for compressibility error.

True airspeed (TAS) is simply the actual speed of an aircraft through the air mass in which it is flying.

The actual speed of the aircraft relative to the free stream is called true airspeed (TAS).

(True airspeed (TAS)—CAS corrected for altitude and nonstandard temperature.)

Mach number (MN) is a true airspeed indication, given as a percentage relative to the local speed of sound; e.g., half the speed of sound = 0.5 Mach.

Mach number is the true airspeed (TAS) of an aircraft, given as a percentage relative to the local speed of sound (LSS) and displayed to the pilot on the Mach meter instrument. For example, half the LSS would be shown as 0.5 Mach.

23). температуры SAT, TAT, OAT

OAT is the ambient outside air temperature.

SAT is the ambient static air temperature. This is commonly used as a different name for outside air tem perature (OAT).

TAT is the total air temperature indicated on the air temperature instrument; it is a product of the static air temperature (SAT) and the adiabatic compression (ram) rise in temperature experienced on the temperature probe.

Static Air Temperature (SAT) is the temperature of the undisturbed air through which the aircraft is about to fly.

Total Air Temperature (TAT) is the maximum temperature attainable by the air when brought to rest, adiabatically.

The increase of air temperature at higher speeds as a result of the adiabatic compression of the air is known as the “Ram Rise”.

24). ILS, NDB, VOR, Precision Approach, Non Precision Approach.

Non precision approach – is a standard instrument approach procedure in which only horizontal guidance is provided.

Precision approach – is a standard instrument approach procedure in which both vertical and horizontal guidance is provided.

A non-directional beacon (NDB) is a medium-range radio navigational aid that sends out a signal in all directions for aircraft to home to. The NDB transmits in the 200- to 1750-kHz medium- and low-frequency bands and uses a surface-wave propagation path.

The automatic direction finder (ADF) is a needle indicator fitted in the aircraft that shows the direction to the selected NDB from the aircraft. This is either displayed as a relative bearing (angle between the aircraft heading and the direction of the NDB) on a relative bearing indicator (RBI) instrument or as a QDM on an RMI instrument.

The Non Directional Beacon (NDB) is a ground based transmitter which transmits vertically polarised radio signals, in all directions (hence the name), in the Low Frequency (LF) and Medium Frequency (MF) bands.

When an aircraft's Automatic Direction Finding (ADF) is tuned to an NDB's frequency and its callsign identified, the direction of the NDB will be indicated.

NDB approach is a non-precision approach that involves using of outer, middle and inner markers.

A VHF omni range (VOR) is a short-range sophisticated and accurate VHF navigational radio aid that outwardly generates specific track/position lines. A VOR ground transmitter radiates line-of-sight signals in all directions. However, unlike a non-directional beacon (NDB), the signal in any particular direction differs slightly from its neighbor. These individual direction signals can be thought of as tracks or position lines radiating out from the VOR ground station. By convention, 360 different and separate tracks away from the VOR are used, each with its position related to magnetic north, i.e., 000 to 359 degrees.

Distance-measuring equipment (DME) is a form of secondary radar that gives continuous distance readout, in nautical miles, of the slant range to a ground station. DME operates in the ultrahigh frequency (UHF) band, between 962 and 1213 MHz, and uses PON transmissions with line-of-sight propagation paths.

DME consists of an onboard aircraft interrogator and a ground beacon transponder (which is opposite to secondary surveillance radar, where the ground equipment is the interrogator and the aircraft equipment is the transponder). The aircraft's interrogator initiates the exchange by transmitting a stream of pulses to the ground station, which then retransmits them back to the aircraft. The time delay between sending and receiving these pulses is converted into a range/distance.

VOR(DME) approach – non-precision approach.

The instrument landing system (ILS) is a precision approach radio aid that gives slope and track guidance to enable low-minima approaches for suitably equipped aircraft. An ILS has two separate ground transmitters:

The localizer. The purpose of the localizer (azimuth) beam is to provide tracking guidance along the extended runway centerline, i.e., azimuth guidance left and right of the extended runway centerline. The localizer transmitter is usually in line with the centerline at the end of the runway, and the signal is protected 10 degrees either side of the centerline up to a height of approximately 6000 ft and out to 25 nautical miles and 35 degrees on either side of the centerline out to 17 nautical miles.

The glide slope. The purpose of the glide-slope (elevation) beam is to provide vertical guidance toward the runway touchdown point, i.e., vertical guidance above and below the glide slope. The glide slope is normally set at an angle of 3 degrees to give a reasonable rate of descent glide path. The glide slope transmitting aerial is usually situated about 300 m in from the runway threshold to ensure adequate wheel clearance over the airfield fence. Therefore, when flying a glide slope, the aim is not to touch down on the runway's piano keys but the touchdown zone near to where the glide slope intersects the runway. The coverage of the glide slope signals extends to 8 degrees on either side of the localizer centerline out to 10 nautical miles.

The aircraft needs its own ILS receiver to decipher the localizer and glide-slope information and then to display it on the indicator.

The ILS localizer works in the 108- to 112-MHz VHF band, which it shares with the VOR. To avoid confusion with VOR signals, the ILS uses frequencies at odd 100- and 150-kHz spacing.

The ILS glide path uses the 329.3- to 335-MHz UHF frequencies at 150-kHz spacing. The glide path frequency is selected automatically when its paired VHF localizer channel is selected. Distance-measuring equipment (DME) is usually paired with the ILS frequency so that it is selected automatically with the ILS.

25). критерии stabilized approach

An approach is stabilised when all of the following criteria are met:

- The aircraft is on the correct flight path
- Only small changes in heading/pitch are necessary to maintain the correct flight path
- The airspeed is not more than VREF + 20kts indicated speed and not less than VREF
- The aircraft is in the correct landing configuration
- Sink rate is no greater than 1000 feet/minute; if an approach requires a sink rate greater than 1000 feet/minute a special briefing should be conducted
- Power setting is appropriate for the aircraft configuration and is not below the minimum power for the approach as defined by the operating manual
- All briefings and checklists have been conducted
- Specific types of approach are stabilized if they also fulfil the following:
    - ILS approaches must be flown within one dot of the glide-slope and localizer
    - a Category II or III approach must be flown within the expanded localizer band
    - during a circling approach wings should be level on final when the aircraft reaches 300 feet above airport elevation; and,
- Unique approach conditions or abnormal conditions requiring a deviation from the above elements of a stabilized approach require a special briefing.

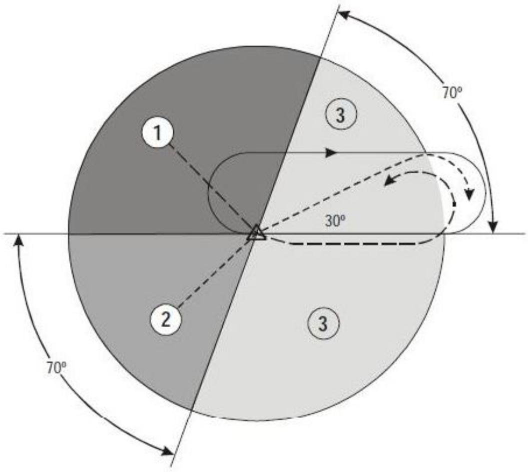
An approach that becomes unstabilised below 1000 feet above airport elevation in IMC or 500 feet above airport elevation in VMC requires an immediate go-around.

26). Holding procedure & holding area (сколько входов в зону ожидания существует и описать как они выполняются) 303

A holding procedure is a predetermined maneuver that keeps an aircraft within a specified airspace while awaiting further clearance. A holding procedure/pattern generally is a racetrack shape.

The standard holding pattern direction is right-hand turns. Therefore, the nonstandard holding pattern direction is left-hand turns.

The three entry procedures into a holding pattern are based on the sector of entry. The three sector regions have been devised based on the direction of the inbound holding track and an imaginary line angled at 70 degrees to the inbound holding track through the fix.



Be aware that you may be approaching a holding fix with a track in one sector but a heading in another sector. It may feel strange, but the sector that relates to the aircraft's heading determines the entry procedure employed.

Sector 1 procedure: Parallel entry. Fly to the fix, and turn onto an outbound heading to fly parallel to the inbound track on the non-holding side for a period of 1 minute plus or minus 1 second per knot wind correction. Then turn in the direction of the holding side through more than 180 degrees to intercept the inbound track to the fix. On reaching the fix, turn to follow the holding pattern.

Sector 2 procedure: Teardrop entry. Fly to the fix, and turn onto a heading to fly a track on the holding side at 30 degrees offset to the reciprocal of the inbound track for a period of 1 minute plus or minus 1 second per knot wind correction. Then turn in the direction of the holding pattern to intercept the inbound track to the fix. On reaching the fix, turn and follow the holding pattern.

Sector 3 procedure: Direct entry. Fly to the fix, and turn to follow the holding pattern. On the face of it, the sector 3 direct entry procedure is the easiest to carry out. But a little thought will show that when joining from the extremities of the sector area, it is necessary to apply some finesse to the procedure. If a full 180-degree or greater turn is required over the fix when joining to take up the outbound heading, then commence turning immediately when you are overhead of the fix.

If, however, the turn onto the outbound heading is less than 180 degrees but greater than 70 degrees, then hold your heading for an appropriate time past the fix, approximately 5 to 15 seconds, before commencing a rate 1 turn onto an outbound track. For example, for a turn of 170 degrees, hold your heading for 5 seconds; for a turn of 70 degrees, hold your heading for 15 seconds.

If, however, the turn onto the outbound heading is close to 180 degrees, then you are already very close to or on the inbound track of the holding pattern. That is, your joining track is close to the hold's inbound track. Therefore, simply turn onto a normal outbound track from over the fix, with only small finesse adjustments, as if you are already in the holding pattern.

27). V1, V2, Vr, Vmcg.

V1 (decision speed) is the maximum speed at which the crew can decide to reject the takeoff, and is ensured to stop the aircraft within the limits of the runway.

VR is the speed at which the pilot initiates the rotation, at the appropriate rate of about 3° per second.

VLOF is the calibrated airspeed at which the aeroplane first becomes airborne.

V2 is the minimum climb speed that must be reached at a height of 35 feet above the runway surface, in case of an engine failure.

VMCG, the minimum control speed on the ground, is the calibrated airspeed during the take-off run, at which, when the critical engine is suddenly made inoperative, it is possible to maintain control of the aeroplane with the use of the primary aerodynamic controls alone (without the use of nose-wheel steering) to enable the take-off to be safely continued using normal piloting skill.

VMCA is the calibrated airspeed, at which, when the critical engine is suddenly made inoperative, it is possible to maintain control of the aeroplane with that engine still inoperative, and maintain straight flight with an angle of bank of not more than 5 degrees.

VMCL, the minimum control speed during approach and landing with all engines operating, is the calibrated airspeed at which, when the critical engine is suddenly made inoperative, it is possible to maintain control of the aeroplane with that engine still inoperative, and maintain straight flight with an angle of bank of not more than 5º.

VMU is the calibrated airspeed at and above which the aeroplane can safely lift off the ground, and continue the take-off.

- VS1g, which corresponds to the maximum lift coefficient (i.e. just before the lift starts decreasing). At that moment, the load factor is still equal to one.

- VS, which corresponds to the conventional stall (i.e. when the lift suddenly collapses). At that moment, the load factor is always less than one.

28). QNH, QFE, QNE, standard pressure (и относительного чего они измеряются)

QNH is a local altimeter setting that makes the altimeter indicate the aircraft's altitude above mean sea level (AMSL) and therefore airfield elevation. There are two types of QNH:

1. Airfield QNH

2. Regional QNH, which is the lowest forecast QNH in an altimeter setting region. QNH is QFE reduced to sea level using international standard atmosphere (ISA) values for the calculation.

QFE. This zeros the altimeter on the airfield elevation datum. (Pressure at the airfield). There are two types of QFE:

1. Airfield QFE is measured at the highest point on the airfield.

2. Touchdown QFE is measured at the touchdown point of the runway in use for precision approaches.

QNE. This is not an altimeter setting but is the height shown at touchdown on the altimeter with 29.92 in or 1013 millibars (hPa) set on the subscale. It is used at very high aerodromes where QFE pressure is so low that it cannot be set on the altimeter subscale.

QNE is seldom used, and, then, only at high-altitude airfields, although it is theoretically possible for it to be needed at low-altitude airfields with extremely low atmospheric pressures. On rare occasions, QFE or QNH cannot be selected on the altimeter subscale when atmospheric pressure values are outside the range of the subscale. At these times the pilot will be instructed by the ATCU to set 1013.2 millibars on his altimeter subscale. The pilot will then be passed the elevation of the airfield above the 1013.2 millibar pressure datum. QNE is defined as the pressure altitude indicated on landing at an aerodrome, when the altimeter sub scale is set to 1013.2 millibars.

Standard setting. 29.92 in or 1013 hPa millibars standard setting will give altimeter readings as a pressure altitude or flight level and is used for traffic controlled airspace above the transition layer.

29). Height, Altitude, Flight level, Pressure, pressure altitude

Height is the measure of vertical distance between the object and datum.

Height is the measured distance above the ground.

Altitude is the measured distance above the local pressure setting (i.e., QNH) or altitude above mean sea level (MSL).

Flight level is the measured pressure level above the 1013-millibar datum.

Pressure altitude or pressure height is the international standard atmosphere (ISA) height above the 1013 millibar pressure datum, at which the pressure value experienced represents that of the level under consideration.

Atmospheric Pressure is the force or weight exerted on any object by the column of air above that object. Atmospheric (or static) pressure acts in all directions and reduces with increasing altitude.

30). Control surface

Roll is controlled by the ailerons; pitch is controlled by the elevators; yaw is controlled by the rudder.

31). your responsibility: during IFR & VFR (difference)/ during approach

32). Как проходит летный день?

33). Как проходит заправка самолета?

Extra:

Accident. An occurrence associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:

a) a person is fatally or seriously injured

b) the aircraft sustains damage

c) the aircraft is missing or is completely inaccessible.

Incident. An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.

Safety. The state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.