PRACTICE EXAM 11

1. Which statement correctly describes the four forces in a steady, unaccelerated climb?

A. Lift exceeds weight, and thrust exceeds drag by a wide margin

B. All four forces are equal to one another in a climb

C. A component of weight acts rearward along the flight path, so required thrust differs from level flight

D. Drag disappears entirely once the climb is established

2. The angle of attack is defined as the angle between which two references?

A. The chord line and the relative wind

B. The chord line and the horizon

C. The longitudinal axis and the ground

D. The flight path and magnetic north

3. Why does a wing stall at the same critical angle of attack regardless of airspeed or attitude?

A. Because the engine fails at that speed

B. Because the propeller loses thrust at that point

C. Because airflow separates from the upper surface once that angle is exceeded

D. Because the elevator becomes ineffective at that weight

4. Induced drag behaves in what way as airspeed decreases?

A. It decreases steadily toward zero

B. It increases, being greatest at low speed and high angle of attack

C. It remains constant at all speeds

D. It exists only above maneuvering speed

5. Total drag for an airplane reaches its minimum at what point?

A. At the never-exceed speed

B. At the stall speed

C. At full power in a climb

D. Where the parasite and induced drag curves intersect

6. Positive static stability is best described as which tendency after a disturbance?

A. To continue moving away from the original condition

B. To return toward the original condition

C. To remain in the new disturbed condition

D. To oscillate with increasing amplitude

7. Dynamic stability describes what aspect of the airplane's response over time?

A. The instantaneous reaction to a control input

B. Whether oscillations following a disturbance dampen, persist, or grow

C. The maximum bank angle achievable

D. The fuel flow required to maintain altitude

8. The ailerons cause the airplane to rotate about which axis?

A. The lateral axis

B. The vertical axis

C. No single axis

D. The longitudinal axis

9. A stall combined with yaw most directly produces which condition?

A. A smooth wings-level descent

B. An increase in lift on both wings

C. A spin, with one wing more deeply stalled than the other

D. An automatic reduction in angle of attack

10. The primary recovery action for a stall is which of the following?

A. Decrease the angle of attack by lowering the nose

B. Increase back pressure to raise the nose

C. Apply full power while holding the nose up

D. Apply full opposite aileron immediately

11. Load factor is best defined as which of the following?

A. The total weight of the aircraft at takeoff

B. The horsepower available divided by drag

C. The ratio of airspeed to stall speed

D. The ratio of the load supported by the wings to the aircraft's weight

12. In a 60° banked level turn, the load factor is approximately what value?

A. 1.0 G

B. 2.0 G

C. 1.15 G

D. 3.9 G

13. Stall speed changes with load factor in what way?

A. It decreases as load factor increases

B. It is independent of load factor

C. It changes only at cruise altitude

D. It increases with the square root of the load factor

14. Maneuvering speed (Va) is best described as which of the following?

A. The minimum speed at which the airplane will fly

B. The maximum speed the airplane should ever reach

C. The best speed for fuel economy

D. The maximum speed for abrupt, full control deflection without structural damage

15. How does maneuvering speed (Va) change as aircraft weight decreases?

A. Va decreases as weight decreases

B. Va increases as weight decreases

C. Va is unaffected by weight

D. Va becomes equal to the never-exceed speed

16. Below maneuvering speed, what protects the airframe from structural damage in turbulence?

A. The wing stalls and relieves the load before the structure is overstressed

B. The engine automatically reduces power

C. The propeller feathers itself

D. The autopilot disconnects the controls

17. Why is the propeller described as a rotating airfoil?

A. Because it stores fuel within the blades

B. Because it controls the airplane's pitch

C. Because it spins faster than the engine crankshaft

D. Because each blade produces a forward force (thrust) much as a wing produces lift

18. Ground effect is best described as which phenomenon?

A. Reduced induced drag and increased lift when flying very close to the surface

B. Increased drag when taxiing on rough ground

C. A loss of engine power near the runway

D. A magnetic disturbance affecting the compass near the ground

19. Which control surface moves the airplane about its lateral axis, controlling pitch?

A. The rudder

B. The elevator

C. The ailerons

D. The trim tab

20. Parasite drag changes with airspeed in what way?

A. It increases with the square of airspeed

B. It decreases as airspeed increases

C. It remains constant regardless of speed

D. It exists only below stall speed

21. During a spin, the airplane follows what kind of flight path?

A. A wings-level straight descent

B. A coordinated level turn

C. A downward corkscrew while rotating about the vertical axis

D. A smooth climbing spiral

22. A standard spin recovery includes which of the following essential actions?

A. Adding full power and pulling back on the elevator

B. Reducing power, applying opposite rudder, and moving the elevator forward to break the stall

C. Maintaining the stall and waiting for it to stop

D. Applying full aileron in the direction of rotation

23. Lift produced by a wing is influenced by which combination of factors?

A. Only the color and material of the wing

B. Airspeed, air density, wing area, and angle of attack

C. Only the weight of the fuel aboard

D. The number of passengers carried

24. Lowering the flaps affects the wing in what way?

A. It decreases both lift and drag

B. It only reduces the aircraft's weight

C. It increases lift and drag, allowing slower, steeper approaches

D. It eliminates the need for elevator control

25. Why does a forward center of gravity result in a higher stall speed?

A. The wings produce excessive lift on their own

B. The tail must produce more download, effectively increasing the wing's load

C. The propeller pushes the nose down

D. The engine runs hotter at forward CG

26. The relative wind is best described as which of the following?

A. The airflow opposite to the aircraft's flight path

B. The wind reported at the destination airport

C. The wind blowing across the runway

D. The propeller wash over the tail

27. Controllability is best described as which of the following?

A. The tendency to return to level flight after a disturbance

B. The fuel required to maintain a given attitude

C. The capability of the aircraft to respond to control inputs

D. The maximum weight the wings can support

28. Why are most training airplanes designed with positive static stability?

A. To make them as responsive as possible to control inputs

B. So they tend to return toward level flight on their own after a disturbance

C. To increase the maximum bank angle

D. To reduce the fuel consumption in cruise

29. An accelerated stall occurs under which condition?

A. Only at very low airspeed in level flight

B. Only when the engine has failed

C. When the critical angle of attack is reached at a higher speed under increased load factor

D. Only during a normal landing flare

30. The Vg diagram (velocity versus load factor) depicts which of the following?

A. The airplane's safe speed-and-load operating limits

B. The fuel burn at various altitudes

C. The magnetic variation across a region

D. The recommended traffic pattern altitude

31. Why does an aft center of gravity reduce longitudinal stability?

A. The wings generate too much lift at aft CG

B. The reduced tail download and shorter effective arm make the airplane more responsive and less stable

C. The propeller thrust line moves upward

D. The fuel burns from the wrong tank first

32. The rudder controls the airplane about which axis?

A. The longitudinal axis

B. The lateral axis

C. The vertical axis

D. No single axis

33. As an airplane's angle of attack increases toward the critical angle, lift does what?

A. Increases up to the critical angle, then drops sharply when exceeded

B. Decreases steadily from the start

C. Remains exactly constant

D. Increases without any limit

34. Coordinated flight—keeping the ball centered—is the best defense against which event?

A. Carburetor icing

B. An overspeed condition

C. A magneto failure

D. An inadvertent spin

35. In unaccelerated straight-and-level flight, which relationship is correct?

A. Lift exceeds weight while thrust exceeds drag

B. Weight exceeds lift while drag exceeds thrust

C. Lift equals weight and thrust equals drag

D. All four forces are unequal

36. Why does load factor increase so steeply beyond a 45° bank angle?

A. The engine produces less power in steep turns

B. The propeller loses efficiency in the bank

C. The fuel shifts to one side of the tanks

D. The wings must support a rapidly increasing multiple of the aircraft's weight to maintain altitude

37. Which best describes neutral static stability?

A. The tendency to return toward the original condition

B. The tendency to continue away from the original condition

C. Oscillations that grow over time

D. The tendency to remain in the new disturbed condition after a disturbance

38. Recognizing an impending stall, a pilot would notice which set of cues?

A. Increasing airspeed and crisp control response

B. A nose-low attitude and rising airspeed

C. A high nose attitude, decreasing airspeed, mushy controls, and buffeting

D. Smooth controls and steady cruise indications

39. The four forces acting on an airplane in flight are which of the following?

A. Lift, weight, thrust, and drag

B. Lift, gravity, power, and friction

C. Pitch, roll, yaw, and trim

D. Pressure, density, temperature, and humidity

40. Why does a stall recovery require lowering the nose rather than raising it?

A. Lowering the nose reduces the angle of attack and reattaches the airflow

B. Raising the nose reduces drag more effectively

C. Lowering the nose increases the angle of attack to regain lift

D. Raising the nose adds power automatically

41. Trim devices serve what purpose?

A. To increase the maximum speed of the airplane

B. To replace the primary flight controls

C. To increase engine power at altitude

D. To relieve the pilot of holding continuous control pressure

42. A wing's lift acts in which direction relative to the relative wind?

A. Parallel to and along the relative wind

B. Directly opposite the relative wind

C. Roughly perpendicular to the relative wind

D. Straight down toward the ground

43. Why does flying into less dense air reduce the lift a wing produces at a given airspeed and angle of attack?

A. Fewer air molecules act on the wing in less dense air

B. The wing becomes heavier in thin air

C. The propeller spins more slowly

D. The angle of attack automatically increases

44. A pilot in a steep turn must increase back pressure for what aerodynamic reason?

A. To reduce the angle of attack

B. To increase the angle of attack and produce the additional lift needed to maintain altitude

C. To lower the stall speed

D. To decrease the load factor

45. The three axes of an airplane all pass through which point?

A. The propeller hub

B. The tip of the vertical stabilizer

C. The center of gravity

D. The leading edge of the wing

46. Why is induced drag a byproduct of producing lift?

A. It results from friction between the engine parts

B. It is associated with the wingtip vortices generated as lift is produced

C. It comes from the propeller wash

D. It is caused by the fuel sloshing in the tanks

47. A wing producing more lift on one side than the other while both are stalled describes which condition?

A. A coordinated descending turn

B. A spin

C. A normal cruise configuration

D. A balanced glide

48. Stability and controllability are balanced by designers to achieve what result?

A. The maximum possible cruise speed

B. The lowest possible fuel burn

C. The greatest range

D. An airplane steady enough to be safe yet responsive enough to maneuver

49. Why does the never-exceed speed (Vne) exist on the airspeed indicator?

A. It marks the absolute speed limit that must never be exceeded

B. It indicates the best fuel-economy speed

C. It shows the minimum controllable airspeed

D. It marks the recommended traffic pattern speed

50. A wing's airfoil shape produces a pressure difference because of what?

A. The fuel stored within the wing

B. The electrical charge on the wingtips

C. The weight of the aircraft pressing down

D. Air accelerating over the curved upper surface, lowering pressure there

Answer Key & Explanations

1. C — In a steady climb, a component of weight acts rearward along the flight path, so the thrust and lift relationships differ from level flight. The forces are not simply equal pairs as in unaccelerated level flight.

2. A — Angle of attack is the angle between the chord line and the relative wind. It is distinct from pitch attitude, which is measured relative to the horizon.

3. C — Once the critical angle of attack is exceeded, airflow separates from the upper surface and lift drops sharply, regardless of airspeed or attitude. This is why a stall is defined by angle, not speed.

4. B — Induced drag increases as airspeed decreases, being greatest at low speed and high angle of attack. It is a byproduct of producing lift and diminishes as speed builds.

5. D — Total drag is lowest where the parasite and induced drag curves intersect, the airplane's most efficient speed. Parasite drag rises with speed while induced drag falls.

6. B — Positive static stability is the initial tendency to return toward the original condition after a disturbance. Most training airplanes are designed this way.

7. B — Dynamic stability describes whether the oscillations following a disturbance dampen out, persist, or grow over time. It concerns the behavior over time, not the instantaneous reaction.

8. D — The ailerons rotate the airplane about the longitudinal axis, producing roll. The elevator and rudder act about the lateral and vertical axes.

9. C — A stall combined with yaw produces a spin, with one wing more deeply stalled than the other, causing autorotation. Coordinated flight prevents this.

10. A — The primary stall recovery is to decrease the angle of attack by lowering the nose, which reattaches the airflow. Raising the nose deepens the stall.

11. D — Load factor is the ratio of the load supported by the wings to the aircraft's weight, expressed in G's. In level flight it is 1 G.

12. B — At a 60° bank in level flight, the load factor is approximately 2.0 G, independent of weight. This is why stall speed rises sharply in steep turns.

13. D — Stall speed increases with the square root of the load factor, so it rises in turns and pull-ups. In a 2-G turn, stall speed rises about 41 percent.

14. D — Maneuvering speed (Va) is the maximum speed for abrupt, full control deflection without exceeding the structural limit. Below it, the wing stalls before the structure is overstressed.

15. A — Maneuvering speed decreases as weight decreases, so a lighter airplane has a lower Va. This counterintuitive relationship matters in turbulence.

16. A — At or below maneuvering speed, the wing stalls and relieves the load before the structure is overstressed. This protects the airframe in turbulence.

17. D — The propeller is a rotating airfoil because each blade produces a forward force, thrust, much as a wing produces lift. The blade is shaped and twisted like a wing.

18. A — Ground effect is the reduction in induced drag and increase in lift when flying very close to the surface. It results from the surface interfering with the wingtip vortices.

19. B — The elevator moves the airplane about the lateral axis, controlling pitch. The ailerons and rudder act about the other two axes.

20. A — Parasite drag increases with the square of airspeed, dominating at high speed. Induced drag, by contrast, decreases as speed increases.

21. C — During a spin, the airplane follows a downward corkscrew path while rotating about its vertical axis. Both wings are stalled, with one more deeply stalled than the other.

22. B — A standard spin recovery reduces power, applies opposite rudder to stop the rotation, and moves the elevator forward to break the stall. The essential steps stop the yaw and reduce the angle of attack.

23. B — Lift is influenced by airspeed, air density, wing area, and angle of attack. Color, fuel weight, and passenger count are not aerodynamic lift factors.

24. C — Lowering the flaps increases lift and drag, allowing slower, steeper approaches and shorter landings. The added drag is the trade-off for the added lift at low speed.

25. B — A forward CG requires the tail to produce more download, effectively increasing the load the wing must support and raising the stall speed. It also increases control forces and stability.

26. A — The relative wind is the airflow opposite to the aircraft's flight path through the air. Angle of attack is measured relative to it.

27. C — Controllability is the capability of the aircraft to respond to the pilot's control inputs. Stability, by contrast, is the tendency to return to a condition after a disturbance.

28. B — Training airplanes are designed with positive static stability so they tend to return toward level flight on their own after a disturbance. This makes them safer and easier to fly.

29. C — An accelerated stall occurs when the critical angle of attack is reached at a higher speed under increased load factor, such as in a steep turn or abrupt pull-up. The stall is still about angle of attack.

30. A — The Vg diagram depicts the airplane's safe speed-and-load operating limits, plotting airspeed against load factor. It shows the stall line, structural limits, maneuvering speed, and never-exceed speed.

31. B — An aft CG reduces the tail download and shortens the effective moment arm, making the airplane more responsive but less stable. Beyond the limit this can make recovery impossible.

32. C — The rudder controls the airplane about the vertical axis, producing yaw. The ailerons and elevator act about the longitudinal and lateral axes.

33. A — Lift increases with angle of attack up to the critical angle, then drops sharply when that angle is exceeded and the airflow separates. This defines the stall.

34. D — Coordinated flight, keeping the ball centered, is the best defense against an inadvertent spin, because a spin requires yaw in combination with a stall. Uncoordinated flight at the stall causes autorotation.

35. C — In unaccelerated straight-and-level flight, lift equals weight and thrust equals drag. The opposing force pairs balance so the airplane neither accelerates nor changes altitude.

36. D — Beyond a 45° bank, the wings must support a rapidly increasing multiple of the aircraft's weight to maintain altitude, so load factor climbs steeply. At 60° it reaches 2 G and rises sharply thereafter.

37. D — Neutral static stability is the tendency to remain in the new disturbed condition after a disturbance, neither returning nor diverging. Positive stability returns and negative stability diverges.

38. C — An impending stall is signaled by a high nose attitude, decreasing airspeed, mushy controls, and aerodynamic buffeting. These cues warn before the wing fully stalls.

39. A — The four forces acting on an airplane are lift, weight, thrust, and drag. Pitch, roll, and yaw are motions, not forces.

40. A — Lowering the nose reduces the angle of attack and reattaches the airflow, recovering from the stall. Raising the nose would increase the angle and deepen the stall.

41. D — Trim devices relieve the pilot of holding continuous control pressure, letting the airplane maintain an attitude and airspeed with minimal effort. They supplement, not replace, the primary controls.

42. C — Lift acts roughly perpendicular to the relative wind. This is why lift and the flight path are not simply vertical and horizontal in climbs and descents.

43. A — In less dense air, fewer air molecules act on the wing, so it produces less lift at a given airspeed and angle of attack. This is why high density altitude degrades performance.

44. B — In a steep turn, the pilot increases back pressure to raise the angle of attack and produce the additional lift needed to maintain altitude against the higher load factor. This also raises the stall speed.

45. C — All three axes pass through the center of gravity, about which the airplane rotates in roll, pitch, and yaw. The CG is the balance point.

46. B — Induced drag is associated with the wingtip vortices generated as the wing produces lift. It is therefore an unavoidable byproduct of lift, greatest at low speed.

47. B — A wing producing more lift on one side while both are stalled describes a spin. The asymmetry drives the autorotation.

48. D — Designers balance stability and controllability to produce an airplane steady enough to be safe yet responsive enough to maneuver. Too much of either alone would be undesirable.

49. A — The never-exceed speed (Vne) marks the absolute speed limit that must never be exceeded, beyond which structural failure or flutter may occur. It is the red line on the airspeed indicator.

50. D — The airfoil produces a pressure difference because air accelerating over the curved upper surface lowers the pressure there, while higher pressure beneath pushes the wing up. This net difference is lift.