

DGCA CPL Practice Paper 07

Technical General — Aerodynamics & Controls

ANSWER KEY & EXPLAINED SOLUTIONS

Original educational practice set. Not an official DGCA paper or a full-length examination simulation.

01 B	02 A	03 A	04 B	05 A
06 B	07 A	08 D	09 C	10 B
11 C	12 B	13 C	14 D	15 A
16 D	17 C	18 D	19 C	20 A
21 C	22 B	23 D	24 D	25 D

01. An aerofoil stalls when it exceeds its critical:

Answer: B. Angle of attack

Stall is associated with airflow separation beyond the critical angle of attack. It can occur at different speeds depending on weight, load factor and configuration.

Topic: Stall | Study reference: AERO

02. Angle of attack is the angle between the wing chord line and:

Answer: A. The relative airflow

Angle of attack relates the chord to the oncoming relative airflow. Pitch attitude relative to the horizon is a different quantity.

Topic: Angle of attack | Study reference: AERO

03. For steady, straight and level unaccelerated flight, the basic force relationships are:

Answer: A. Lift equals weight and thrust equals drag

With no acceleration, opposing forces balance. A sustained imbalance would change the aircraft's motion.

Topic: Forces | Study reference: AERO

04. Using $L = 0.5 \rho V^2 S C_L$, what happens to lift if speed doubles while ρ , S and C_L remain constant?

Answer: B. It becomes four times as large

Lift varies with the square of speed when the other terms are fixed. Doubling speed multiplies V^2 by four.

Topic: Lift equation | Study reference: AERO

05. At the same weight and configuration in steady level flight, reducing speed generally requires:

Answer: A. An increase in lift coefficient

Level flight still requires lift equal to weight. With a lower dynamic pressure, a higher lift coefficient is needed, usually by increasing angle of attack.

Topic: Lift coefficient | Study reference: AERO

06. Induced drag is associated primarily with:

Answer: B. Producing lift

Lift generation produces downwash and wingtip-vortex effects that tilt the aerodynamic force rearward, creating induced drag.

Topic: Induced drag | Study reference: AERO

07. At constant weight in steady level flight, induced drag generally increases when speed:

Answer: A. Decreases

At lower speed, higher lift coefficient is needed, increasing induced drag. The trend assumes sustained level flight and a valid flight regime.

Topic: Drag relationship | Study reference: AERO

08. At otherwise similar conditions, parasite drag generally varies approximately with:

Answer: D. The square of airspeed

Parasite drag is strongly related to dynamic pressure and therefore approximately to speed squared when drag coefficient and density are unchanged.

Topic: Parasite drag | Study reference: AERO

09. For a simplified total-drag curve, minimum total drag occurs approximately where:

Answer: C. Induced drag equals parasite drag

For the usual parabolic drag model, minimum total drag lies at the intersection of induced- and parasite-drag contributions.

Topic: Minimum drag | Study reference: AERO

10. An aircraft in a level coordinated 60-degree banked turn has load factor $n = 1/\cos(\text{bank})$. What is n ?

Answer: B. 2

$\cos 60 \text{ degrees} = 0.5$, so $n = 1/0.5 = 2$. The increased total lift supplies both vertical support and turning force.

Topic: Load factor | Study reference: AERO

11. If the 1 g stall speed is 50 kt, what is the approximate stall speed at 2 g in the same configuration?

Answer: C. 71 kt

Stall speed varies with $\sqrt{n}$. $50 \times \sqrt{2} = 70.7 \text{ kt}$, approximately 71 kt.

Topic: Accelerated stall | Study reference: AERO

12. Which primary control mainly produces roll on a conventional aeroplane?

Answer: B. Ailerons

Ailerons create a difference in wing lift, causing roll about the longitudinal axis. Rudder mainly controls yaw and elevator mainly controls pitch.

Topic: Flight controls | Study reference: CTRL

13. Elevator movement mainly controls rotation about the:

Answer: C. Lateral axis

Pitch is rotation about the lateral axis. On a conventional aeroplane it is primarily controlled by the elevator or equivalent pitch-control surface.

Topic: Axes | Study reference: CTRL

14. The rudder primarily controls:

Answer: D. Yaw about the vertical axis

Rudder changes the side force on the vertical tail and mainly controls yaw. It is not the primary pitch control.

Topic: Flight controls | Study reference: CTRL

15. Adverse yaw during an aileron-induced roll is mainly caused by:

Answer: A. A difference in drag between the wings

The wing producing increased lift can also produce increased drag, causing yaw opposite the intended turn unless compensated.

Topic: Adverse yaw | Study reference: AERO

16. In a conventional trailing-edge flap system, flap extension commonly:

Answer: D. Increases maximum lift coefficient and drag

Flaps change wing geometry and commonly increase maximum lift coefficient, allowing a lower stall speed, while also increasing drag.

Topic: High-lift devices | Study reference: CTRL

17. Leading-edge slats primarily help by:

Answer: C. Delaying separation and increasing attainable angle of attack

Slats modify airflow near the leading edge and can delay separation, permitting a higher maximum lift coefficient and angle of attack.

Topic: High-lift devices | Study reference: CTRL

18. Wing spoilers generally act to:

Answer: D. Reduce lift and increase drag

Spoilers disturb airflow over the wing. They can reduce lift and increase drag, with functions depending on the aircraft design.

Topic: Spoilers | Study reference: CTRL

19. Trim is used mainly to:

Answer: C. Reduce sustained control force for a selected condition

Trim relieves the pilot of continuous control force at the chosen condition. Retrimming may be needed after speed or configuration changes.

Topic: Trim | Study reference: CTRL

20. Positive static stability means an initial tendency after a disturbance to:

Answer: A. Return toward the original equilibrium

Static stability describes the initial tendency. Dynamic stability concerns how motion evolves with time and is a separate assessment.

Topic: Stability | Study reference: AERO

21. Moving the CG aft within the permitted range generally reduces:

Answer: C. Longitudinal static stability

An aft CG generally reduces the restoring pitching tendency. Approved CG limits are therefore important even when total mass is acceptable.

Topic: CG and stability | Study reference: AERO

22. Dihedral on a conventional wing contributes mainly to:

Answer: B. Lateral stability

Dihedral contributes a restoring rolling tendency during sideslip. The net aircraft response also depends on other design features.

Topic: Lateral stability | Study reference: AERO

23. Ground effect generally reduces which component of drag near the surface?

Answer: D. Induced drag

Proximity to the surface alters downwash and wingtip-vortex effects, reducing induced drag. This does not eliminate other drag components.

Topic: Ground effect | Study reference: AERO

24. Wingtip vortices are generally strongest when an aircraft is:

Answer: D. Heavy, clean and slow

For the lift required, high weight and low speed in a clean configuration tend to produce strong wake vortices. Operational separation remains essential.

Topic: Wake turbulence | Study reference: AERO

25. Flutter is best described as:

Answer: D. A potentially destructive interaction of aerodynamic, elastic and inertial forces

Flutter is a self-excited aeroelastic oscillation. It can become destructive; it is not simply any ordinary vibration.

Topic: Aeroelasticity | Study reference: AERO

Study references & review notes

Use these sources to revise the concepts behind your answers. Questions and explanations are newly written; they are not reproduced from an official question bank.

AERO — FAA PHAK, Chapter 5: Aerodynamics of Flight

https://www.faa.gov/sites/faa.gov/files/07_phak_ch5_0.pdf

https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak

Scope: foundation-to-intermediate CPL ground-subject practice. This set does not claim complete coverage of the latest DGCA syllabus. Consult the current DGCA CAR Section 7, Series B and Pariksha notices for the applicable syllabus and examination requirements. Aircraft-type-specific Technical Specific and a complete RTR(A) course are not included.

FAA references support general theory only, not Indian regulatory requirements. CAP 413 is used for standard phrase meanings, not UK-specific operating rules. Weather reports, fuel reserves and flight scenarios in questions are illustrative. For operational use, consult current approved publications and aircraft manuals.

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