

DGCA CPL Practice Paper 02

Air Navigation — Set B

ANSWER KEY & EXPLAINED SOLUTIONS

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

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01. An aircraft is on the 135-degree radial of a VOR. What magnetic bearing leads directly to the station, disregarding wind?

Answer: A. 315 degrees

A radial is measured outward from the VOR. The bearing to the station is its reciprocal: $135 + 180 = 315$ degrees.

Topic: VOR radial | Study reference: NAV

02. On an ADF with a fixed relative-bearing scale, magnetic heading is 070 degrees and relative bearing is 040 degrees. What is the magnetic bearing to the NDB?

Answer: B. 110 degrees

Bearing to the station = magnetic heading + relative bearing, reduced to 000-359 degrees. Here $070 + 040 = 110$ degrees.

Topic: ADF bearing | Study reference: NAV

03. Magnetic heading is 300 degrees and an ADF relative bearing is 100 degrees. What is the magnetic bearing to the station?

Answer: B. 040 degrees

$300 + 100 = 400$ degrees. Subtract 360 to give 040 degrees. The addition must be normalised to a full circle.

Topic: ADF bearing | Study reference: NAV

04. DME indicates which distance to its ground station?

Answer: B. Slant range

DME measures the direct line between aircraft and station. Height separation therefore contributes to the reading, particularly close to overhead.

Topic: DME | Study reference: NAV

05. An aircraft is directly above a DME station and 6,080 ft higher than it. Using $6,080 \text{ ft} = 1 \text{ NM}$ for this exercise, the DME should read approximately:

Answer: A. 1 NM

Directly overhead, horizontal separation is almost zero, but the slant range equals height separation. 6,080 ft is approximately 1 NM here.

Topic: DME geometry | Study reference: NAV

06. Which ILS component provides lateral guidance toward the runway centreline?

Answer: C. Localizer

The localizer supplies left-right guidance. The glide slope supplies vertical guidance; neither DME nor a marker alone supplies lateral course guidance.

Topic: ILS | Study reference: NAV

07. Which ILS component supplies vertical approach guidance?

Answer: C. Glide slope

The glide slope defines a vertical guidance path. The localizer is the separate component for lateral alignment.

Topic: ILS | Study reference: NAV

08. Why does usable VHF radio range generally increase with aircraft height?

Answer: A. The radio horizon extends

VHF propagation is mainly line-of-sight. Raising an antenna extends the geometric horizon and can improve reception, subject to terrain and equipment limitations.

Topic: Radio propagation | Study reference: NAV

09. An aircraft has mass 1,000 kg and total moment 2,450 kg m about a specified datum. What is its centre-of-gravity arm?

Answer: D. 2.45 m

$\text{CG arm} = \text{total moment} / \text{total mass} = 2,450 / 1,000 = 2.45 \text{ m}$. All moments must use the same datum and consistent units.

Topic: Mass and balance | Study reference: PERF

10. A 900 kg aircraft has CG arm 2.0 m. A 100 kg load is added at arm 3.0 m. What is the new CG arm?

Answer: D. 2.10 m

Original moment = $900 \times 2 = 1,800 \text{ kg m}$. Add 300 kg m and divide 2,100 by the new mass 1,000 kg: $\text{CG} = 2.10 \text{ m}$.

Topic: Mass and balance | Study reference: PERF

11. In a 1,200 kg aircraft, a 60 kg load is moved aft by 2 m without changing total mass. What is the CG movement?

Answer: D. 0.10 m aft

CG shift = moved mass x distance/total mass = $60 \times 2 / 1,200 = 0.10$ m. The CG moves in the same direction as the load.

Topic: CG shift | Study reference: PERF

12. Fuel has mass 144 kg and density 0.72 kg/litre. What is its volume?

Answer: C. 200 litres

Volume = mass/density = $144 / 0.72 = 200$ litres. Multiplying would calculate mass from volume, not volume from mass.

Topic: Fuel conversion | Study reference: PERF

13. At constant configuration and load factor, stall speed is proportional to the square root of weight. Weight increases from 1,000 to 1,210 kg; original stall speed is 50 kt. Find the new stall speed.

Answer: D. 55 kt

New speed = $50 \times \sqrt{1,210 / 1,000} = 50 \times 1.1 = 55$ kt. The square-root relationship assumes other conditions remain unchanged.

Topic: Performance | Study reference: PERF

14. Rate of climb is 600 ft/min and ground speed is 120 kt. What climb gradient is achieved in ft/NM?

Answer: B. 300 ft/NM

120 kt equals 2 NM/min. Gradient = 600 ft/min divided by 2 NM/min = 300 ft/NM.

Topic: Climb planning | Study reference: PERF

15. A descent must lose 6,000 ft in 20 NM. At 120 kt ground speed, what constant descent rate is needed?

Answer: A. 600 ft/min

At 2 NM/min, 20 NM takes 10 min. Descent rate = $6,000 / 10 = 600$ ft/min. This is a planning calculation, not a clearance.

Topic: Descent planning | Study reference: PERF

16. Under a simplified 3-degree-path rule of 300 ft per NM, how much height is lost over 12 NM?

Answer: D. 3,600 ft

Use the given approximation: $12 \times 300 = 3,600$ ft. The rule is approximate and does not include threshold-crossing height.

Topic: Descent approximation | Study reference: PERF

17. With the aircraft stationary at the same elevation, increasing the altimeter pressure setting causes the indicated altitude to:

Answer: A. Increase

A higher selected reference pressure makes the measured static pressure correspond to a greater indicated height. The aircraft itself has not climbed.

Topic: Altimetry | Study reference: INST

18. An aircraft flies from higher to lower atmospheric pressure without resetting the altimeter. Compared with the indicated altitude, its true altitude is generally:

Answer: B. Lower

With an excessively high pressure setting for the new area, the altimeter overreads. True altitude can therefore be lower than indicated.

Topic: Altimetry | Study reference: INST

19. Which instrument directly compares pitot pressure with static pressure?

Answer: C. Airspeed indicator

The airspeed indicator senses total pressure minus static pressure. The pressure difference is related to dynamic pressure and indicated airspeed.

Topic: Pitot-static | Study reference: INST

20. If a conventional static source becomes blocked, which instrument initially remains fixed at the altitude where blockage occurred?

Answer: A. Altimeter

Trapped static pressure prevents the altimeter from sensing later pressure changes. The other listed instruments do not use static pressure to indicate altitude.

Topic: Static blockage | Study reference: INST

21. A standard-rate turn is 3 degrees per second. How long does a 180-degree turn take?

Answer: C. 60 seconds

Time = angular change/rate = $180/3 = 60$ seconds. This assumes the stated turn rate remains constant.

Topic: Turn rate | Study reference: INST

22. Using a wind-triangle model, TAS is 100 kt and the pure crosswind component is 20 kt. What is the required wind-correction angle, approximately?

Answer: D. 11.5 degrees

$\sin(\text{WCA}) = \text{crosswind}/\text{TAS} = 0.2$. $\text{WCA} = \arcsin(0.2)$, approximately 11.5 degrees into the wind.

Topic: Wind triangle | Study reference: NAV

23. An aircraft must maintain a due-east track with TAS 100 kt and a 20 kt wind from the north. What is its approximate ground speed when the crosswind is fully corrected?

Answer: C. 98 kt

The northward airspeed component cancels 20 kt of wind. The eastward component is $\sqrt{100^2 - 20^2} = 97.98$ kt, about 98 kt.

Topic: Wind triangle | Study reference: NAV

24. At a constant 90 kt ground speed, two fixes are passed 8 minutes apart. What is the distance between them?

Answer: C. 12 NM

Distance = $90 \times 8/60 = 12$ NM. The calculation uses ground speed because the fixes are fixed to Earth.

Topic: Position fixing | Study reference: NAV

25. For a GPS position solution with receiver clock error also unknown, the usual minimum number of satellites for a three-dimensional solution is:

Answer: B. Four

Four independent measurements solve three position coordinates and receiver clock offset. This does not guarantee adequate geometry or integrity for every operation.

Topic: GNSS principles | Study reference: NAV

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.

INST — FAA PHAK, Chapter 8: Flight Instruments

https://www.faa.gov/sites/faa.gov/files/10_phak_ch8.pdf

NAV — FAA Pilot's Handbook of Aeronautical Knowledge, Chapter 16: Navigation

https://www.faa.gov/sites/faa.gov/files/18_phak_ch16.pdf

PERF — FAA PHAK, Chapters 10–11: Weight and Balance; Aircraft Performance

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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