

 DGCA AIR REGULATIONS · CHAPTER 6

# Separation Methods & Minima

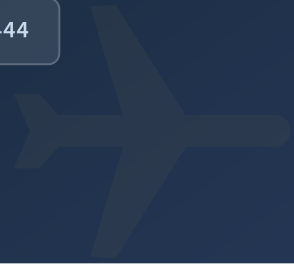
PANS ATM Doc 4444 · AIP India · CPL / ATPL Ground Study Notes

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 PANS ATM Doc 4444

IN AIP India



## 1

## General Provisions – Separation of Controlled Traffic

Vertical or horizontal separation shall be provided in the following situations:

- ▶ **Between all flights** in **Class A** and **Class B** airspaces
- ▶ **Between IFR flights** in **Class C**, **D** and **E** airspaces
- ▶ **Between IFR and VFR flights** in **Class C** airspace
- ▶ **Between IFR and Special VFR flights**
- ▶ **Between Special VFR flights** – when prescribed by the appropriate ATS authority – *except* for IFR flights in Class D & E, during daylight when flights have been cleared to climb/descend maintaining own separation and remaining in VMC

### DEFINITION – COMPOSITE SEPARATION

A combination of **vertical separation** and **horizontal separation**, using minima for each which may be **lower than, but not less than half of**, those used for each element when applied individually.

⚠ **Composite separation shall only be applied on the basis of regional air navigation agreements.**

## 2

## Vertical Separation

### 2.1 VERTICAL SEPARATION MINIMA

#### ⚠ STANDARD – BELOW FL 290

Nominal **1 000 ft** below FL 290

Nominal **2 000 ft** at or above FL 290

*(except as per RVSM rules)*

#### ✅ RVSM – REDUCED VERTICAL

Nominal **1 000 ft** when:

- Both aircraft are **RVSM compliant**, AND
- Operating within **designated RVSM airspace**

#### ⊘ CRUISE CLIMB – INDIA SPECIFIC

**Cruise climb is NOT permitted in Indian FIRs.**

## 2.2 VERTICAL SEPARATION DURING CLIMB & DESCENT

### 📄 GENERAL RULE

An aircraft **may** be cleared to a level previously occupied by another aircraft *after the latter has reported vacating it*,

#### EXCEPT when:

1. Severe turbulence is known to exist; OR
2. The aircraft concerned are established at the **same holding pattern**; OR
3. The difference in aircraft performance is such that **less than the applicable separation minimum may result** — in which case clearance shall be withheld until the vacating aircraft has reported at or passing another level separated by the required minimum.

### ✅ PILOT-PILOT COMMUNICATION

Pilots in direct communication with each other may, with their concurrence, be cleared to **maintain a specified vertical separation between their aircraft during ascent or descent**.

## 2.3 VMC CLIMB AND DESCENTS

### 📄 VMC OWN SEPARATION – CONDITIONS

When requested by an aircraft **and** agreed by the pilot of the other aircraft, an ATC unit may clear a controlled flight (including departing/arriving) operating in **Class D** or **Class E** airspace in **VMC during daylight hours** to fly subject to:

- Maintaining **own separation** to one other aircraft, AND
- Remaining in **VMC**

#### When so cleared, the following shall apply:

- ▶ Clearances shall be for a specified portion of the flight at or below **10,000 ft** during climb and descent
- ▶ **Essential traffic information** shall be passed
- ▶ If VMC may become impracticable, an **IFR flight shall be provided alternative instructions** to be complied with in the event VMC cannot be maintained

## 3

## Horizontal Separation

### THREE TYPES OF HORIZONTAL SEPARATION

A) LATERAL SEPARATION

B) LONGITUDINAL SEPARATION

C) ATS SURVEILLANCE-BASED

### 3.1 LATERAL SEPARATION

Lateral separation may be applied by the following means:

#### 3.1.1 By Geographic Location (Position Reports)

##### GEOGRAPHIC SEPARATION

By position reports which positively indicate the aircraft are over **different geographic locations** as determined visually or by reference to a navigation aid.

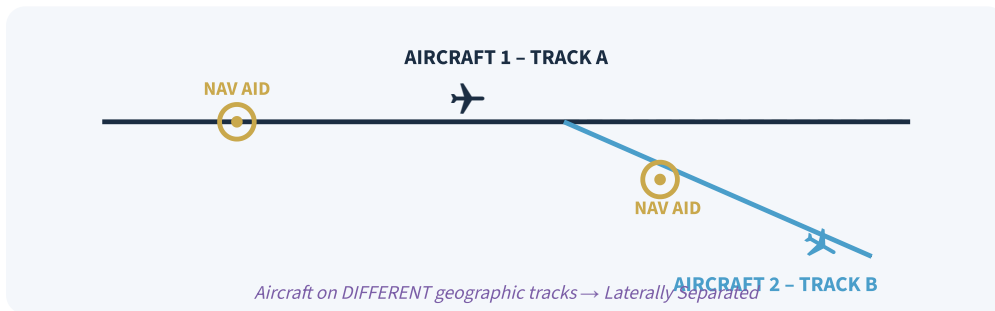


Fig 3.1 – Lateral Separation by Different Geographic Locations

#### 3.1.2 By Use of NDB, VOR or GNSS on Intersecting Tracks / ATS Routes

Aircraft are required to fly on specified tracks separated by a minimum amount appropriate to the navigation aid employed.

Nav Aid	Angular Divergence Requirement	Distance Condition	Additional Rule
<b>VOR</b>	Radials diverging by at least <b>15°</b>	At least one aircraft is <b>15 NM</b> or more from the facility	—
<b>NDB</b>	Tracks diverging by at least <b>30°</b>	At least one aircraft is <b>15 NM</b> or more from the facility	Track of second aircraft must be at least <b>20°</b> from the radial of the first aircraft
<b>GNSS / GNSS</b>	Zero offset between two waypoints on track	At least one aircraft at minimum distance from common point (see table below)	Controller must confirm GNSS navigation and no lateral offsets
<b>VOR / GNSS</b>	VOR aircraft on radial; GNSS aircraft zero-offset between waypoints	At least one aircraft at minimum distance from common point (see table below)	Same as GNSS/GNSS

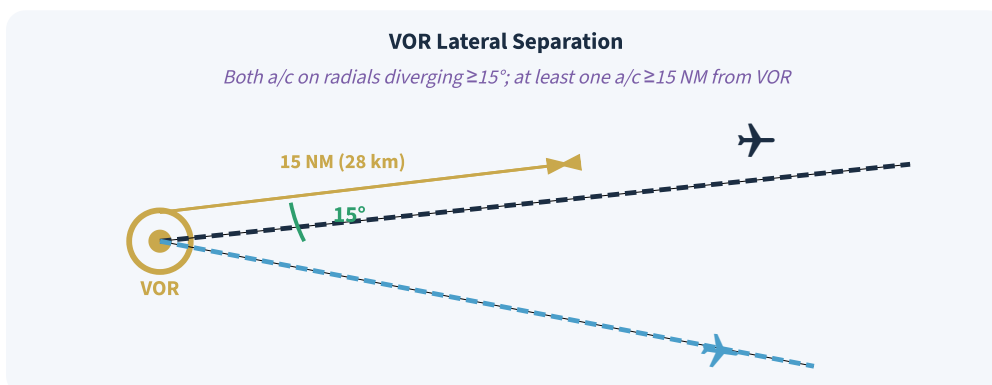


Fig 3.2 – VOR Lateral Separation (15° divergence, 15 NM)

### 3.1.3 GNSS / VOR-GNSS Distance Table

Angular Difference at Common Point (°)	Aircraft: VOR or GNSS + GNSS · FL 010–FL 190 · Distance from common point	Aircraft: VOR or GNSS + GNSS · FL 200–FL 600 · Distance from common point
<b>15 – 135°</b>	<b>27.8 km (15 NM)</b>	<b>43 km (23 NM)</b>

**IMPORTANT NOTE**

The distances in the table are **ground distances**. States must account for **slant range** from DME source to receiving antenna when DME is used for range information.

### ⚠️ GNSS TRACK SEPARATION – CONTROLLER CHECKLIST

Before applying GNSS-based track separation, the controller **shall confirm**:

- The aircraft is navigating using **GNSS**, AND
- In airspace where strategic lateral offsets are authorized, a **lateral offset is NOT being applied**

**GNSS-based track separation shall NOT be applied in cases of pilot-reported RAIM outages.**

#### 3.1.4 Different Navigation Aids or Methods

##### ▣ MIXED NAV AID LATERAL SEPARATION

Lateral separation between aircraft using different navigation aids (or when one aircraft uses RNAV equipment) shall be established by ensuring the **derived protected airspaces for the navigation aid(s) or RNP do not overlap.**

### 3.2 LONGITUDINAL SEPARATION

##### ▣ PRINCIPLE

Longitudinal separation shall be applied so that the spacing between the **estimated positions** of the aircraft being separated is **never less than a prescribed minimum.**

#### 3.2.1 Track Definitions (Critical for Exam)

##### ▣ A) SAME TRACK

Same direction tracks and intersecting tracks or portions thereof, the angular difference of which is **less than 45° or more than 315°**, and whose protection areas overlap.

##### ▣ B) RECIPROCAL TRACKS

Opposite tracks and intersecting tracks or portions thereof, the angular difference of which is **more than 135° but less than 225°**, and whose protection areas overlap.

##### ▣ C) CROSSING TRACKS

Intersecting tracks or portions thereof **other than** those specified in Same Track (a) and Reciprocal Tracks (b) above – i.e. angular difference **45° to 135° or 225° to 315°**.

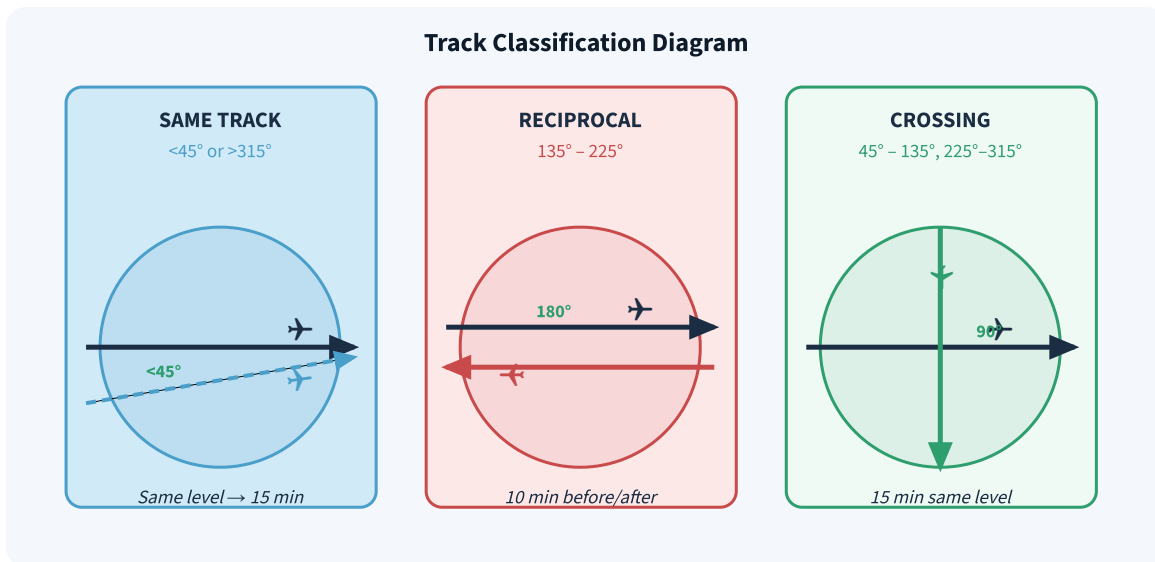


Fig 3.3 – Three Types of Track Relationships (Same / Reciprocal / Crossing)

## 4 Longitudinal Separation Minima – Time Based

### 📄 CROSS-CHECK REQUIREMENT

Separation requirements must be **cross-checked** to ensure the integrity of calculations. The cross-check validates the initial calculation and confirms it is consistent with the traffic disposition.

### 4.1 AIRCRAFT AT THE SAME CRUISING LEVEL

#### Aircraft flying on the SAME TRACK

<p><b>15</b> MINUTES</p> <p>Standard — when nav aids do NOT permit frequent position/speed determination</p>	<p><b>10</b> MINUTES</p> <p>When nav aids PERMIT frequent determination of position and speed</p>	<p><b>5</b> MINUTES</p> <p>Preceding a/c <math>\geq 37</math> kmph (20 kt) FASTER. Requires: same aerodrome departure, OR same exact significant point, OR 5-min guaranteed at route join</p>	<p><b>3</b> MINUTES</p> <p>Preceding a/c <math>\geq 74</math> kmph (40 kt) FASTER. Same conditions as 5-minute cases</p>
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### ✓ 5-MINUTE SEPARATION – THREE QUALIFYING CASES

1. Between aircraft that have **departed from the same aerodrome**
2. Between en-route aircraft that have **reported over the same exact significant point**
3. Between departing and en-route aircraft after the en-route aircraft has reported over a fix so located as to ensure 5-min separation can be established at the **point the departing aircraft will join the route**

### ⚠ 3-MINUTE SEPARATION – CONDITION

Same three cases as for 5-minute separation, BUT the preceding aircraft must be maintaining a true airspeed faster than the succeeding aircraft of **74 kmph (40 knots) or more**.

### Aircraft flying on CROSSING TRACKS – Same Level

<p><b>15</b> MINUTES</p> <p>Standard — no frequent position/speed determination</p>	<p><b>10</b> MINUTES</p> <p>Nav aids permit frequent position/speed determination</p>	<p><b>10</b> MINUTES</p> <p>While vertical separation does NOT exist, with navigation aids permitting frequent position/speed determination</p>	<p><b>5</b> MINUTES</p> <p>While vertical sep does not exist, level change commenced within 10 min of second a/c reporting over exact reporting point</p>
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## 4.2 AIRCRAFT CLIMBING OR DESCENDING – SAME TRACK

### 📘 RULE: PASSING THROUGH ANOTHER AIRCRAFT'S LEVEL (SAME TRACK)

When an aircraft will **pass through the level** of another aircraft on the same track, the following minimum longitudinal separation shall be provided:

- **15 minutes** while vertical separation does not exist

## 4.3 AIRCRAFT CLIMBING OR DESCENDING – CROSSING TRACKS

Least 10 minutes prior to and after the time the aircraft are estimated to pass:

**15****MINUTES**

While vertical separation does not exist  
(standard)

**10****MINUTES**

While vertical sep does not exist — only  
where ground-based nav aids or GNSS  
permit frequent position/speed  
determination

**5****MINUTES**

While vert sep does not exist, provided:  
level change within 10 min of second a/c  
reporting over common point AND CPDLC  
restriction added if applicable

#### 4.4 TRAFFIC ON RECIPROCAL TRACKS — CLIMBING OR DESCENDING

##### ⚠️ RECIPROCAL TRACK RULE

Where lateral separation is NOT provided, **vertical separation shall be provided for at least 10 minutes prior to and after the time the aircraft are estimated to pass, or are estimated to have passed.**

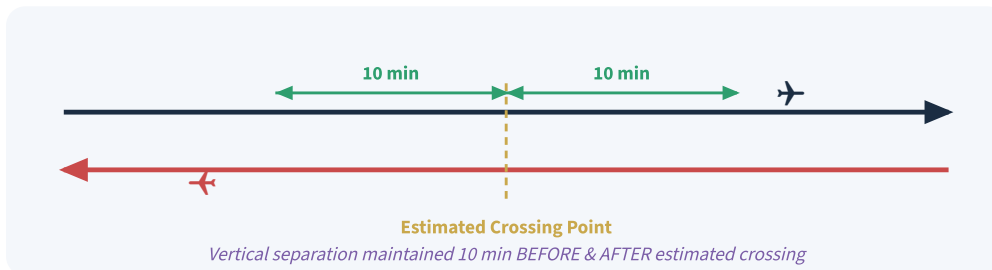


Fig 4.1 — 10-Minute Separation on Reciprocal Tracks

**5**

## Longitudinal Separation — Distance Based (DME / GNSS)

### 📌 APPLICABILITY

Separation shall be established by maintaining not less than specified distances between aircraft positions as reported by reference to **DME in conjunction with other nav aids and/or GNSS**. Applied between:

- Two aircraft using **DME**
- Two aircraft using **GNSS**
- One aircraft using **DME** + one using **GNSS**

**Direct controller-pilot VHF voice communication shall be maintained while this separation is used.**

 **GNSS NOTE**

For GNSS-based separation minimum, a distance derived from an **integrated navigation system incorporating GNSS input is regarded as equivalent to GNSS distance**.

All distance reports must be made with reference to the **same DME station**.

When applying these minima to any aircraft with area navigation capability, controllers shall specifically **request GNSS derived distance**.

 **WHEN LATERAL SEPARATION IS NOT PROVIDED**

Vertical separation shall be provided for inadequate onboard equipment, on GNSS input into an integrated navigation system, or a **loss of GNSS integrity**.

*Note: Traffic on reciprocal tracks may make it impossible for a pilot to provide GNSS distance information.*

**5.1 AIRCRAFT AT SAME CRUISING LEVEL – SAME TRACK**

 **A) 20 NM – BASELINE**

Provided each aircraft utilizes:

- Same **"on track" DME station** (both on DME), OR
- "On track" DME + **collocated waypoint** (one DME, one GNSS), OR
- Same **waypoint** (both GNSS)

AND separation is checked by obtaining **simultaneous DME/GNSS readings** at frequent intervals.

 **B) 10 NM – REDUCED (SPEED CONDITION)**

Same reference requirements as 20 NM, PLUS:

The **leading aircraft** maintains a true airspeed of **20 kt or more faster** than the succeeding aircraft.

Separation checked simultaneously at frequent intervals.

**5.2 AIRCRAFT AT SAME LEVEL – CROSSING TRACKS**

Minimum	Conditions	Speed Condition	Angle Condition
20 NM	Each a/c reports distance from DME/collocated waypoint/same waypoint at crossing point	None required	Relative angle between tracks $<90^\circ$
10 NM	Same reference + simultaneous DME/GNSS checks	Leading a/c $\geq 20$ kt faster	Relative angle $<90^\circ$

### 5.3 AIRCRAFT CLIMBING OR DESCENDING — SAME TRACK

#### 10 NM WHILE VERTICAL SEPARATION DOES NOT EXIST, PROVIDED:

- Each aircraft utilizes the same "on track" DME / collocated waypoint / same waypoint
- One aircraft **maintains a level** while vertical separation does not exist
- Separation established by obtaining **simultaneous DME/GNSS readings**

### 5.4 AIRCRAFT ON RECIPROCAL TRACKS — DME/GNSS

#### RECIPROCAL TRACKS — CLIMB/DESCENT

Aircraft utilizing on-track DME and/or collocated waypoint or same waypoint may be cleared to climb or descend to or through levels occupied by other aircraft utilizing same references, **provided it has been positively established that the aircraft have passed each other and are at least 10 NM apart.**

## 6

## Separation Minima — ATS Surveillance Systems (Radar / ADS-B / MLAT)

System	Range / Condition	Horizontal Separation Minimum
Radar	Up to 60 NM from radar head	5 NM
Radar	Beyond 60 NM from radar head	10 NM
ADS-B only (non-radar)	Within 60 NM of ADS-B ground station	5 NM
ADS-B only (non-radar)	Beyond 60 NM of ADS-B ground station	10 NM
Radar (Special Authorization)	Specifically authorized conditions	3 NM

7

# Master Summary – Longitudinal Separation

## Time-Based Longitudinal Separation Summary

Separation	Nav Aid Condition	Track Type	Phase	Speed Condition
15 min	Nav aids do NOT permit frequent pos/speed determination	Same track, Crossing track	Same level, Climb/Descend	None
10 min	Nav aids permit frequent pos/speed determination	Same track, Crossing track	Same level, Climb/Descend	None
10 min	Any	Reciprocal	10 min before & after crossing	None
5 min	Common reference point	Same track	Same level, Climb/Descend	Preceding a/c ≥20 kt faster
5 min	Common ref (GNSS/ground)	Crossing	Climb/Descend (level change within 10 min)	None
3 min	Common reference point	Same track	Same level	Preceding a/c ≥40 kt faster

## DME/GNSS Distance-Based Separation Summary

Minimum	Track Type	Phase	Speed Condition	Angle Condition
20 NM	Same track	Same level	None	—
20 NM	Crossing	Same level	None	<90°
10 NM	Same track	Same level	Leading a/c ≥20 kt faster	—
10 NM	Crossing	Same level	Leading a/c ≥20 kt faster	<90°
10 NM	Same track	Climbing/Descending (one a/c maintains level)	None	—
10 NM	Reciprocal	Climb/Descend after confirmed passing	None	—

## 8

## Longitudinal Separation – Mach Number Technique

### ▣ WHEN MACH NUMBER TECHNIQUE IS APPLIED

Minimum longitudinal separation between turbojet aircraft on the **same track**, whether in level, climbing or descending flight, shall be:

- 10 minutes ,OR
- The prescribed minima based on application of **differential Mach number** on prescribed ATS routes

### ✓ RNAV DISTANCE SEPARATION WITH MACH TECHNIQUE

- RNAV distance-based separation may be applied between **RNAV-equipped aircraft** on designated RNAV routes or ATS routes defined by VOR
- A 150 km (80 NM) RNAV distance-based separation minimum with Mach number technique may be used on same-direction tracks **in lieu of a 10-minute longitudinal separation minimum**

### 8.1 PERFORMANCE-BASED CONCEPTS (DEFINITIONS)

#### ▣ RNP – REQUIRED NAVIGATION PERFORMANCE

A statement of navigation performance necessary for operation within a defined airspace. For en-route phase: RNP 1, 4, 10, 12.6 and 20 .

#### ▣ PBN – PERFORMANCE-BASED NAVIGATION

The prescribed navigation specification shall be appropriate to the level of communications, navigation and ATS provided in the airspace. (Refer Doc 9613)

#### ▣ RCP – REQUIRED COMMUNICATION PERFORMANCE

A set of requirements for ATS provision, aircraft capability, and operations to support performance-based communication. RCP number = **seconds for instruction to travel ground→aircraft→ground**.  
Examples: RCP 10, 60, 120, 240, 400 .

#### ▣ RSP – REQUIRED SURVEILLANCE PERFORMANCE

Number of seconds for surveillance data from the CSP interface to arrive at the ATSU flight data processing system. RSP 180, 240, 400 indicate time in seconds between flight crew/HMI and controller/HMI.  
HMI = Human Machine Interaction.

### ● PBS — PERFORMANCE-BASED SURVEILLANCE

ATS surveillance services and capability based on performance requirements for ATS provision, aircraft flight operations along an ATS route, on an instrument approach procedure, or in a designated airspace.

## 8.2 PERFORMANCE-BASED LONGITUDINAL SEPARATION MINIMA (TABLE)

For aircraft cruising, climbing or descending on the **same track** OR crossing tracks (relative angle  $<90^\circ$ ):

Separation Minima	RNP	RCP	RSP	Max ADS-C Periodic Reporting Interval
93 km (50 NM)	10	240	180	27 minutes
	4	240	180	32 minutes
55.5 km (30 NM)	2 or 4	240	180	12 minutes
5 minutes	2 or 4 or 10	240	180	14 minutes

### 📄 FMS/RNAV IN CONVENTIONAL PROCEDURES

When authorised in the **Aircraft Flight Manual (AFM)**, FMS/RNAV may be used to fly conventional procedures provided the procedures are monitored using basic display associated with these procedures and **tolerances for using raw data on the basic display are complied with.**

## 9

## Essential Traffic Information

### ⚠️ DEFINITION — ESSENTIAL TRAFFIC

Essential traffic is that **controlled traffic to which the provision of separation by ATC is applicable**, but which, in relation to a particular controlled flight, is **not, or will not be, separated from other controlled traffic by the appropriate separation minimum.**

**Essential traffic information shall be given to controlled flights concerned whenever they constitute essential traffic to each other.**

## 10

## DGCA Exam Practice Questions with Explanations

1 An aircraft is maintaining FL 150 within airspace class D. Another aircraft below at FL 140 is receiving a clearance to descend to FL 70. There is severe turbulence in the area. When is the earliest that a clearance to descend to FL 140 or below can be expected?

- A When the other aircraft has reported that it has left FL 140.
- B When the other aircraft has reported that it has reached FL 70.
- C When the other aircraft has reported that it has descended through FL 130.

Answer: C — In severe turbulence, normal "vacating" rules are suspended. Clearance shall be withheld until the vacating aircraft has reported at or passing another level separated by the required minimum (1000 ft). So the other a/c must report passing FL 130 (which is 1000 ft below FL 140).

2 The longitudinal separation minima between aircraft departed from the same aerodrome and following the same track, and the preceding aircraft is maintaining a true airspeed of 20kt or more faster than the succeeding aircraft, is:

- A 5 minutes.
- B 3 minutes.
- C 2 minutes.

Answer: A — Same aerodrome, same track, preceding a/c 20 kt (37 kmph) faster = 5-minute longitudinal separation.

3 The longitudinal separation minima based on time between aircraft at same cruising level where navigation aids permit frequent determination of position and speed and the preceding aircraft is maintaining a true airspeed of 40kt or more faster than the succeeding aircraft, is:

- A 5 minutes.
- B 3 minutes.
- C 10 minutes.

Answer: B — Nav aids permit frequent position/speed determination + preceding a/c  $\geq 40$  kt faster = 3 minutes (the additional speed condition reduces from 5 min to 3 min).

4 The longitudinal separation minima based on time between aircraft at same cruising level where navigation aids permit frequent determination of position and speed and the preceding aircraft is maintaining a true airspeed of 20kt or more faster than the succeeding aircraft, is:

- A 15 minutes
- B 10 minutes
- C 5 minutes

✔ Answer: C – Nav aids OK + preceding a/c  $\geq 20$  kt (37 kmph) faster = 5 minutes.

5 The longitudinal separation minima based on time between aircraft at same cruising level where navigation aids permit frequent determination of position and speed, is:

- A 10 minutes.
- B 3 minutes.
- C 15 minutes.

✔ Answer: A – Same cruising level, nav aids permit frequent determination, no speed advantage stated = 10 minutes baseline.

6 The longitudinal separation minima between aircraft departed from the same aerodrome and following the same track, and the preceding aircraft is maintaining a true airspeed of 40kt or more faster than the succeeding aircraft, is:

- A 10 minutes.
- B 8 minutes.
- C 3 minutes.

✔ Answer: C – Same aerodrome, same track, preceding a/c  $\geq 40$  kt (74 kmph) faster = 3 minutes.

7 The longitudinal separation minima based on distance using DME, and each aircraft "on track" uses DME stations, is:

- A 10NM
- B 20NM
- C 5NM

✔ Answer: B – Baseline DME longitudinal separation on same track, same cruising level = 20 NM.

**8** When an aircraft will pass through the level of another aircraft on the same track, the following minimum longitudinal separation shall be provided:

- A 5 minutes at the time the level is crossed.
- B 15 minutes while vertical separation does not exist.
- C 10 minutes at the time the level is crossed.

Answer: B – Aircraft climbing/descending through the level of another on same track = 15 minutes while vertical separation does not exist.

**9** "Essential Traffic" is that controlled flight to which the provision of separation by ATC is applicable, but which, in relation to a particular controlled flight is not separated therefore by the appropriate separation minima. The following flights are considered essential traffic one to each other:

- A All IFR flights in controlled airspace and controlled VFR.
- B Only controlled IFR flights.
- C Controlled VFR flights and VFR flights.

Answer: A – Essential traffic applies to all controlled traffic: IFR and controlled VFR flights in controlled airspace.

**10** Above FL 290 the vertical flight separation between aircraft on the same direction is:

- A 2000ft.
- B 2000ft (but 1000ft in RVSM).
- C 3000ft.

Answer: A/B – Above FL 290, nominal 2000 ft, EXCEPT in RVSM airspace where both aircraft are RVSM compliant, in which case 1000 ft applies. Correct DGCA answer per answer key = B (2000ft).

**11** Track separation between aircraft using the same NDB shall be applied requiring the aircraft to fly:

- A At least 30° separated at a distance of 15NM or more from the facility.
- B At least 45° separated at a distance of 15NM or more from the facility.
- C At least 30° separated at a distance of 15 miles or more from the facility.

Answer: A – NDB lateral separation: tracks diverging  $\geq 30^\circ$  with at least one aircraft  $\geq 15$  NM (nautical miles, not statute miles) from the facility.

**12** Two aircraft flying at FL 170 using GNSS are confirmed to be established on tracks separated by 120 degrees with zero offset between two waypoints. At least one aircraft is to be at a minimum distance \_\_\_\_\_ NMs from a common point for separation.

- A 5
- B 10
- C 15

Answer: C – FL 170 falls in the FL 010–FL 190 bracket. Angular difference 120° is in the 15–135° range. Distance from common point = 27.8 km (15 NM).

**13** If an ATC clearance is not suitable to the pilot in command of an aircraft:

- A He may request another clearance and the ATC concerned has to accept the pilot request.
- B He may request and, if practicable, obtain an amended clearance.
- C The pilot has to accept the ATC clearance because it has been based on the flightplan filed with ATC.

Answer: B – The pilot may request an amended clearance; ATC will issue one if practicable. ATC is not obligated to accept the pilot's request verbatim, but must consider it.

**14** The "VMC and own separation" ATC clearance is used for a controlled flight to cross the level of another controlled flight when:

- A Requested by the pilot in airspace classes A and B and authorised by ATC.
- B Requested by the pilot, during the day light and authorized by the state overflown.
- C Requested by the pilot and authorized by the state overflown.

Answer: B – VMC own separation applies in Class D and E airspace, requested by pilot, during daylight hours, and authorized by the appropriate ATS authority (state overflown).

**15** A/c on same level converging track has separation:

- A 15min
- B 10min
- C 5min

Answer: A – Crossing tracks (which includes converging tracks) at same level = 15 minutes standard separation (when nav aids do not permit frequent determination).

16 What are the controlled IFR separation methods applied by ATC?

- A Vertical, horizontal and composite separation.
- B Time separation and track separation.
- C Composite separation.

Answer: A – ATC applies vertical separation, horizontal separation (lateral + longitudinal + surveillance-based), and composite separation.

17 The vertical IFR separation minimum being applied by ATC within a controlled airspace below FL 290 is:

- A 500ft (150m).
- B 2000ft (600m).
- C 1000ft (300m).

Answer: C – Below FL 290, nominal vertical separation minimum = 1000 ft (approximately 300 m).

18 The vertical IFR separation minimum being applied by ATC within a controlled airspace above FL 290 is:

- A 500ft (150m).
- B 2000ft (600m).
- C 1000ft (300m).

Answer: B – Above FL 290 (non-RVSM), nominal vertical separation = 2000 ft (approximately 600 m).

19 Longitudinal separation minima based on distance using DME for aircraft at the same cruising level and track, provided that each aircraft utilizes "on Track" DME stations and separation is checked by obtaining simultaneous DME readings, is:

- A 20NM
- B 25NM
- C 40NM

Answer: A – Same cruising level, same track, both using "on track" DME = 20 NM baseline separation.

20 A "RNAV" distance based separation minimum may be used at the time the level is crossed, provided that each aircraft reports its distance to or from the same "on track" way-point. This minimum is:

- A 20NM
- B 80NM
- C 60NM

✔ Answer: B – RNAV distance-based separation with Mach number technique = 150 km / 80 NM on same direction tracks (in lieu of 10-minute longitudinal separation).

21 A VFR flight constitutes essential traffic to other VFR flights, when operating in controlled airspace classified as:

- A B
- B B, C, D and E
- C B and C

✔ Answer: A – In Class B airspace, separation is provided between ALL flights (including VFR-VFR), so VFR flights constitute essential traffic to each other there.

22 RCP 120 is the number of:

- A Transmissions loaded on aircraft FMS for data link exchange.
- B Minutes required to divert to a suitable aerodrome under ETOP conditions.
- C Seconds it takes for an instruction to travel from the ground to aircraft and acknowledgment back to the ground.

✔ Answer: C – RCP is classified based on transaction time in seconds. RCP 120 = the total round-trip communication takes 120 seconds.

23 Vertical or horizontal separation shall be provided between:

- A All flights in class A, B and C airspaces.
- B All flights in class A and B airspaces.
- C All flights in class B, C and D airspaces.

✔ Answer: B – Between ALL flights in Class A and B airspaces; in C, D, E it is only between IFR-IFR (and IFR-VFR in Class C).

24 The separation method whereby the vertical and horizontal separation may be reduced till a maximum of half the standard criteria is called:

- A Composite separation.
- B Reduced separation.
- C Combined separation.

Answer: A – Composite separation uses minima that may be lower than, but not less than half of, those used individually for vertical or horizontal separation.

25 ADS-B ground station is more than 110 NMs from two aircraft at same level. Only ADS-B is being used for separation in non radar environment. The minimum safe distance between these aircraft is \_\_\_\_\_ NMs.

- A 10
- B 5
- C 3

Answer: A – Beyond 60 NM of ADS-B ground station in non-radar environment = 10 NM separation (110 NM is beyond 60 NM threshold).

26 Cruising level IFR during cruise within controlled airspace shall be given as flight level (FL):

- A Above the transition altitude when applicable.
- B Only in airspace class A.
- C If the obstacle clearance is more than 2000ft.

Answer: A – Cruising levels are expressed as flight levels (FL) above the transition altitude. Below transition altitude, altitudes (QNH) are used.

27 Aircraft flying along the same track may be separated by DME-distances from the same DME and it is confirmed that the aircraft have passed each other. Specify the shortest difference in DME-distance to make it possible for one aircraft to climb or descend:

- A 10NM
- B 12NM
- C 15NM

Answer: A – Aircraft on reciprocal tracks using on-track DME may climb/descend after it is positively established they have passed each other and are at least 10 NM apart.

28 Track separation between aircraft using the same VOR shall be applied requiring the aircraft to fly:

- A At least 15° separated at a distance of 15 miles or more from the facility.
- B At least 15° separated at a distance of 15NM or more from the facility.**
- C At least 30° separated at a distance of 15NM or more from the facility.

Answer: B – VOR lateral separation: radials diverging  $\geq 15^\circ$  with at least one aircraft  $\geq 15$  NM (nautical miles) from the VOR.  
Note: miles vs NM is a common trap!

29 ATC clearances are solely issued for:

- A Alerting pilots about other aircraft in close vicinity.
- B Making pilots follow laid down procedures.
- C Expediting and separating air traffic.**

Answer: C – ATC clearances are solely issued for the purpose of expediting and separating air traffic.

30 The longitudinal separation minima based on DME, and each aircraft "on track" uses DME stations, is:

- A 10NM provided that the leading aircraft maintains a true airspeed of 40kt or more faster than the succeeding aircraft.
- B 10NM provided that the leading aircraft maintains a true airspeed of 20kt or more faster than the succeeding aircraft.**
- C 20NM provided that the leading aircraft maintains a true airspeed of 10kt or more faster than the succeeding aircraft.

Answer: B – DME separation can be reduced from 20 NM to 10 NM when the leading aircraft is at least 20 kt faster.

31 FMS/RNAV:

- A Can be used for conventional procedures only if AFM permits.**
- B Cannot be used for conventional procedures.
- C Can be used for conventional procedures if permitted by DGCA.

Answer: A – FMS/RNAV may be used for conventional procedures only when authorised in the Aircraft Flight Manual (AFM), with basic display monitoring and raw data tolerance compliance.



## Quick Reference Card – All Key Values at a Glance

Parameter	Value	Condition / Note
Vertical Sep below FL 290	<b>1 000 ft</b>	Standard non-RVSM
Vertical Sep at/above FL 290	<b>2 000 ft</b>	Standard non-RVSM
Vertical Sep (RVSM)	<b>1 000 ft</b>	Both a/c RVSM compliant, in RVSM airspace
Cruise Climb	<b>NOT permitted</b>	Indian FIRs
VOR Lateral Sep	<b>15°, 15 NM</b>	Radials $\geq 15^\circ$ diverging; at least one a/c $\geq 15$ NM
NDB Lateral Sep	<b>30°, 15 NM</b>	Tracks $\geq 30^\circ$ diverging; at least one a/c $\geq 15$ NM; 2nd track $\geq 20^\circ$ from first radial
GNSS/GNSS distance (FL 010–190)	<b>15 NM (27.8 km)</b>	Angular diff 15–135°
GNSS/GNSS distance (FL 200–600)	<b>23 NM (43 km)</b>	Angular diff 15–135°
Same Track (standard)	<b>15 min</b>	Angular diff $< 45^\circ$ or $> 315^\circ$
Reciprocal Tracks	<b>135°–225°</b>	10 min before/after crossing
Crossing Tracks	<b>45°–135° or 225°–315°</b>	15 min standard
Long Sep with 20 kt speed adv	<b>5 min</b>	Same aerodrome/point; 37 kmph faster
Long Sep with 40 kt speed adv	<b>3 min</b>	Same aerodrome/point; 74 kmph faster
DME baseline (same track)	<b>20 NM</b>	Same level
DME reduced (20 kt faster)	<b>10 NM</b>	Leading a/c $\geq 20$ kt faster
DME climbing/descending	<b>10 NM</b>	Same track; one a/c maintains level
Radar Sep $\leq 60$ NM	<b>5 NM</b>	From radar head
Radar Sep $> 60$ NM	<b>10 NM</b>	From radar head
Radar Sep (special auth)	<b>3 NM</b>	Specifically authorised only
ADS-B only $\leq 60$ NM	<b>5 NM</b>	Non-radar environment
ADS-B only $> 60$ NM	<b>10 NM</b>	Non-radar environment
RNAV/Mach technique	<b>80 NM (150 km)</b>	Same direction; lieu of 10-min sep
VMC own sep — altitude limit	<b>10 000 ft</b>	During climb/descent in Class D/E, daylight

Parameter	Value	Condition / Note
RCP transaction time	<b>seconds</b> (ground↔a/c)	RCP 10/60/120/240/400

### Capt. Pankaj Pahil – DGCA Ground Study Notes

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For CPL/ATPL examination preparation. All values as per DGCA regulations.

Capt. Pankaj Pahil