

# Performance Based Navigation – PBN1

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## Exam questions:

1. The factors used to define RNAV or RNP system performance requirements are:
  - A. Safety, Integrity, Reasonableness, Usability
  - B. Accuracy, Integrity, Continuity, Usability
  - C. Safety, Accuracy, Integrity, Continuity, Functionality
  - D. Accuracy, Integrity, Availability, Continuity, Functionality
  
2. Unlike conventional navigation, PBN:
  - A. Relies on ground based navigation aids
  - B. Requires the pilot to use raw data provided by the navigation infrastructure
  - C. Is not sensor specific and relies on computed data to navigate
  - D. Only makes use of space based navigation infrastructure
  
3. The components of a PBN infrastructure are:
  - A. Navigation aid infrastructure, navigation accuracy, navigation maintenance
  - B. Navigation aid infrastructure, air traffic specification, navigation application
  - C. Navigation aid infrastructure, navigation specification, navigation application
  - D. Navigation aid infrastructure, air traffic specification, navigation maintenance
  
4. During the approach phases of flight, PBN accommodates:
  - A. Linear and laterally guided operations
  - B. Linear guided operations only
  - C. Linear and angular laterally guided operations
  - D. Laterally guided operations only
  
5. With regards to the RNAV and RNP navigation specifications:
  - A. RNAV requires on-board performance monitoring and alerting, whereas RNP does not
  - B. Neither RNP or RNAV require on-board performance monitoring and alerting
  - C. Both RNP and RNAV require on-board performance monitoring and alerting
  - D. RNP requires on-board performance monitoring and alerting, whereas RNAV does not

6. The functional requirements of RNAV and RNP specifications:
1. Lateral Deviation
  2. Distance/bearing to an active waypoint
  3. Groundspeed or time to active waypoint
  4. Navigation data storage
  5. Failure indication
- A. 1, 2, 4 and 5  
B. 1, 3 and 4  
C. 1, 2, 3, 4 and 5  
D. 1, 2 and 5
7. Considering RNP X, the X is:
- A. The lateral distance from track the aircraft can be expected to remain for 100% of the time
  - B. The lateral distance from track the aircraft can be expected to remain for 95% of the time
  - C. The lateral distance from track the aircraft can be expected to remain for 90% of the time
  - D. The lateral distance from track the aircraft can be expected to remain for 75% of the time
8. If an aircraft is approved to meet RNP 1 specification:
- A. It automatically gains approval for RNP 2
  - B. It may not necessarily meet functional requirements for RNP 2
  - C. It automatically gains approval for RNP 1
  - D. It automatically gains approval for RNP 0.3
9. When in arrival and departure phases of flight, the PBN navigation specifications which can be used are:
- A. RNAV 2 and RNP 2
  - B. RNAV 20 and RNP 20
  - C. RNAV 1 and RNP 1
  - D. RNAV 15 and RNP 15

10. The airworthiness approval process assures that:
1. The type and design of the RNAV equipment installed is appropriate to the intended function
  2. The operator does not need any further operational approval in order to meet PBN specification
  3. The installation functions properly under foreseeable operating conditions
  4. The installation functions properly under the specific operators operating conditions
- A. 1, 2 and 4  
B. 1 and 3 only  
C. 1, 2 and 3  
D. 3 only

11. A fixed radius transition (FRT):
- A. Is a path terminator to be used with en-route procedures
  - B. Is a path terminator defined by radius, arc length and fix
  - C. Has 2 possible radii, 22.5nm for high altitudes and 15nm for low altitudes
  - D. Has 2 possible radii, 15nm for high altitudes and 5nm for low altitudes

12. What type of ARINC 424 navigation database entry is demonstrated by the diagram:



- A. Radius to fix (RF) path terminator
  - B. Fly by turn waypoint
  - C. Fly over waypoint
  - D. Fixed radius transition
13. The safety of the navigation application is contingent on:
- A. The accuracy and integrity of the data
  - B. The accuracy of the data only
  - C. The accuracy, resolution and integrity of the data
  - D. The resolution and integrity of the data
14. Navigation system accuracy depends on:
- A. Total system error
  - B. Path definition error
  - C. Flight technical error
  - D. Navigation system error

15. On board performance monitoring and alerting of flight technical error is managed by:
- On board systems
  - Crew procedures
  - On board systems and air traffic management
  - On board systems and crew procedures
16. The navigation database must be valid for the current AIRAC cycle:
- Unless otherwise stated in the operations documentation or acceptable means of compliance
  - Unless there is no updated version to be installed
  - Unless the operations manual allows the aircraft to dispatch with an out of data database
  - Unless pilots have checked the route against appropriate charts
17. When operating in RNAV 10 airspace, aircraft incorporating dual INS, FMS or IRU's:
- Have a standard time limitation beyond which the aircraft may not operate in RNAV 10 airspace
  - Have a variable time limitation depending on the accuracy of the RNAV system at the point of entry into the RNAV 10 airspace
  - Have no time limitation
  - May not operate in RNAV 10 airspace as GNSS is required
18. If pilots wish to fly an RNAV/RNP 1 / 2 SID or STAR:
- It may be entered manually, waypoint by waypoint
  - It must be retrievable by route name, from a separate, independent navigation database and must conform to the charted route.
  - It must be retrievable by route name from the on-board navigation database
  - It must be retrievable by route name from the on-board navigation database and must conform to the charted route.
19. An RNP approach to LPV minima is:
- 3D operation that requires a Final Approach Segment Data Block
  - 2D operation that requires a Final Approach Segment Data Block
  - 3D operation that requires an Initial and Final Approach Segment Data Block
  - 2D operation that does not require any Data-Block
20. Refer to the figure below. It illustrates which type of ARINC 424 path terminator:



- Direct to a fix
- Track to a fix
- Initial Fix
- Fixed Radius turn

# Performance Based Navigation – PBN2

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## Exam questions:

1. With respect to RNAV or RNP navigation specifications, 'continuity' is defined as the capability of the system to:
  - a. Function with the specified accuracy and integrity at all times
  - b. Function with the specified integrity during the intended operation
  - c. Function with the specified accuracy at all times
  - d. Function with the specified accuracy and integrity during the intended operation
  
2. Computed Data:
  - a. Ignores all raw data received from the ground based and space based nav aids
  - b. Only uses raw data from the ground based and space based nav aids.
  - c. Consists of only data manually calculated by the aircrew for use in the navigation and positioning solution
  - d. Integrates various raw data sources to provide a navigation and positioning solution.
  
3. The RNAV (GNSS) Z RWY 26 approach to Clermont – Ferrand Airport is an example of:
  - a. A PBN navigation application
  - b. A PBN navigation specification
  - c. PBN navigation infrastructure
  - d. A conventional navigational approach
  
4. In oceanic/remote, en-route and terminal phases of flight, PBN is limited to operations with:
  - a. Linear, lateral and vertical requirements and time constraints
  - b. Linear and lateral performance requirements and time constraints
  - c. Linear, lateral and vertical requirements
  - d. Lateral performance requirements and time constraints
  
5. When operating in RNAV 10 airspace, what is the required navigational accuracy?
  - a. +/- 5nm lateral accuracy for 95% of the flight time by population of aircraft operating in the airspace
  - b. +/- 10nm linear accuracy for 95% of the flight time by population of aircraft operating in the airspace
  - c. +/- 10nm lateral accuracy for 95% of the flight time by population of aircraft operating in the airspace
  - d. +/- 10nm lateral accuracy for 99% of the flight time by population of aircraft operating in the airspace

6. When in arrival and departure phases of flight, PBN navigation specifications to be used are:
- RNAV 2 and RNP 2
  - RNAV 0.3 and RNP 0.3
  - RNAV 1 and RNP 1
  - RNAV 15 and RNP 15
7. A Radius to Fix (RF) leg:
- Is a path terminator to be used with en-route procedures
  - Is a path terminator defined by radius, arc length and fix
  - Has 2 possible radii, 22.5nm for high altitudes and 15nm for low altitudes
  - Has 2 possible radii, 15nm for high altitudes and 5nm for low altitudes
8. The standards for coding SIDs and STARs in a navigation database are set by:
- SITA 424 path terminators
  - ARINC 424 path terminators
  - ARINC 242 path terminators
  - SITA 44 path terminators
9. Which path terminator defines a point in space from which an RNAV procedure would start?
- IF
  - IAF
  - FA
  - CF
10. An off-set flight path is one which:
- Runs parallel to the defined path
  - Runs at an angle to the defined path
  - Runs parallel to the defined path and may be flown whenever the pilot deems necessary
  - Should be flown to avoid prohibited areas
11. Which of the following components define a holding pattern:
- Holding waypoint
  - Inbound course
  - Turn direction
  - Leg time/distance
- A. 1, 2 and 3
- B. 1, 2 and 4
- C. 1 and 2 only
- D. 1, 2, 3 and 4

12. The FTE (Flight technical error) is:
- The pilots ability to follow a defined path or track
  - The pilot or autopilots ability to follow a defined path or track
  - The pilots ability to accurately load the route
  - The autopilots ability to follow the pilots instructions
13. If loss of PBN capability occurs then:
- Abnormal and emergency procedures are to be used
  - Abnormal and contingency procedures are to be used
  - Emergency and non-normal procedures are to be used
  - Normal procedures are to be used
14. RNAV 10 requires that an aircraft operating in oceanic and remote areas are to be equipped with:
- 3 independent and serviceable long range navigation systems comprising an INS, IRS/FMS or GNSS
  - At least 2 independent and serviceable long range navigation systems comprising an INS, IRS/FMS or GNSS
  - At least 3 independent and serviceable long range navigation systems comprising an INS, IRS/FMS or GNSS
  - At least 2 independent and serviceable long range navigation systems comprising an INS, IRS/FMS or twin VOR
15. The RNAV 5 navigation specification:
- Requires on board performance monitoring and alerting
  - Allows the crew to manually enter navigational data
  - Requires the crew to only chose from named procedures in the navigational database
  - Is automatically approved for use by operators to meet RNAV 2 specification
16. If a pilot wishes to fly an RNAV or RNP SID/STAR, the route can subsequently be modified in response to ATC clearance:
- Only by inserting a specific waypoint
  - By inserting (from the database) or deleting specific waypoints
  - By only deleting specific waypoints
  - By creation of new waypoints in response to ATC clearance
17. When conducting an RNP approach using BaroNAV:
- The correct altimeter setting is not critical, since the radio altimeter is more accurate
  - The correct temperature setting is critical for the safe conduct of the approach
  - The correct altimeter setting is useful for the safe conduct of the approach
  - The correct altimeter setting is critical for the safe conduct of the approach

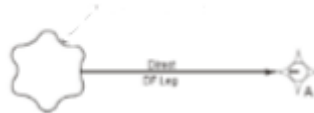
18. Considering RNP AP APCH, which of the following statements are true?

- a. RNP AP APCH can only be used for straight in approaches with wide separation between aircraft
- b. RNP AP APCH is a form of RNP APCH that may be used by aircrew whenever required
- c. Authorisation is required for both the aircraft and aircrew
- d. RNP AP APCH requires no on-board performance monitoring and alerting

19. Advanced RNP incorporates the navigation specifications of:

- a. RNAV 10, RNAV 2, RNAV 1, RNP 2, RNP 1, and RNP 0.3
- b. RNAV 10, RNAV 2, RNAV 1, RNP 2 and RNP 1
- c. RNAV 5, RNAV 2, RNAV 1, RNP 2, RNP 1, and RNP APCH
- d. RNAV 5, RNAV 2, RNAV 1, RNP 5, RNP 2, RNP 1, and RNP APCH

20. Refer to the figure below. It illustrates which type of ARINC 424 path terminator:



- a. Direct to a fix
- b. Track to a fix
- c. Initial Fix
- d. Fixed Radius turn

# Performance Based Navigation – PBN3

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## Exam questions:

1. With respect to RNAV or RNP navigation specifications, 'integrity' is defined as:
  - a. The level of trust that can be placed in the navigation system
  - b. The level of trust that can be placed in all of the aircraft systems
  - c. The level of trust that the pilots can place in the navigation data in the FMS nav database
2. When in remote/oceanic phases of flight, PBN navigation specification used are:
  - a. RNAV 10 and RNP 4
  - b. RNAV 1 and RNP 4
  - c. RNAV 5 and RNAV 10
  - d. RNAV 10 and RNAV 15
3. When in en-route phases of flight, PBN navigation specification used are:
  - a. RNAV 4
  - b. RNAV 1 and RNAV 4
  - c. RNAV 5
  - d. RNAV 1 and RNAV 10
4. Which ARINC 424 path terminator is typically used in departures or missed approaches and requires the aircraft to follow a specific course that terminates when at or above a specific altitude?
  - a. TA
  - b. CA
  - c. FA
  - d. CF
5. Path Definition error (PDE) is:
  - a. Any mistakes made by the procedure designer when creating the desired path
  - b. The difference between the desired path and the path ATC asks the aircraft to take
  - c. The difference between the desired path and the path actually taken by the aircraft
  - d. The difference between path defined in the navigation database and the desired path
6. Navigation system error (NSE) is:
  - a. The difference between the aircrafts desired position and its actual position
  - b. The difference between the aircrafts estimated position and its desired position
  - c. The difference between the aircrafts estimated position and its FMC position
  - d. The difference between the aircrafts estimated position and its actual position

7. When the system cannot guarantee that the position meets the accuracy requirement:
- An alert is issued
  - The navigation system responds by going into heading mode
  - Built in test equipment rectifies the problem
  - The TSE is set to zero
8. An RNP approach to LNAV minima is:
- A non precision approach designed for 2D operations
  - A precision approach designed for 3D operations
  - A non precision approach designed for 3D operations
  - A precision approach designed for 2D operations
9. An RNP approach to LNAV/VNAV minima:
- Has lateral guidance based on GNSS and vertical guidance based on SBAS or BaroVNAV
  - Has lateral and vertical guidance based on GNSS
  - Has lateral guidance based on SBAS and vertical guidance based on BaroVNAV
  - Has lateral guidance based on GNSS and vertical guidance based on the radio altimeter
10. A pilot wishes to fly an RNP APCH approach procedure, which of the following are true:
- The pilot may manually enter the waypoints for the procedure
  - The procedure must be retrievable by route name from an on-board navigation database
  - The procedure must be retrievable by route name from an external navigation database
  - Specific waypoints may be inserted and deleted at any time
  - Specific waypoints may be inserted by name from the navigation database, or deleted, in response to ATC clearance
- A. 1, 2 and 5 are correct
- B. 2, 3 and 4 are correct
- C. 2 and 5 are correct
- D. 2 and 4 are correct