1. What are the characteristics of a ground based augmentation system?

The GNSS errors are detected in close proximity to an area of interest and transmitted using a ground station simulating a satellite, called a pseudolite

2. Which of the following has had a significant effect on the role and importance of aeronautical information and flight data?

The introduction of RNAV, RNP and computer systems

3. ICAO Annex 11 defines Area Navigation (RNAV) as a method of navigation which permits aircraft operation on any desired flight path:

Within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these

4. Considering the Airworthiness Certification Objectives, Precision RNAV (P-RNAV) requires a track-keeping accuracy of:

1.0 NM standard deviation or better for 95% of the flight time

5. Basic RNAV requires a track-keeping accuracy of:

+/- 5NM or better for 95% of the flight time

6. RNAV equipment will

a) Allow frequent changes in flight plan and ATC clearances to be executed by the air crew

b) Lead to a more economic air transport

c) Permit airplanes to be navigated along direct tracks between predetermined as well as chosen waypoints, with a high order of accuracy

All 3 answers are correct

7. One of the benefits of RNAV is:

RNAV allows aircraft to take a more direct flight path without requiring to fly over ground based facilities

8. RNP types shall be determined on the basis of:

Communication, navigation and air traffic services provided in the airspace concerned

9. RNP means a statement of:

The navigation performance necessary for operation within a defined airspace

10. The abbreviation RNP means:

Required navigation performance

11. Required Navigation Performance (RNP) shall be prescribed

By states on the basis of regional air navigation agreements

ICAO FANS defines the RNP as required navigation accuracy in the horizontal plane in a defined airspace. The state defines what RNP type (1 - ?) has to be applied within his airspace.

12. Concerning to RNP (Required Navigation Performance) types, the indication RNP 4, represents a navigation accuracy of

Plus or minus 4 NM on a 95 per cent containment basis

13. Which of the following has had a significant effect on the role and importance of aeronautical information and flight data?

The introduction of RNAV, RNP and computer systems

14. The navigational function of the Horizontal Situation Indicator (HSI) in relation to Area Navigation Systems is:

The indication of the cross track distance (XTK)

15. Which of the following statements regarding B-RNAV is correct?

For 95% of the flight time, the track keeping accuracy must not exceed 5 NM

16. According to Annex 6, "RNP type" is defined as a containment value expressed as a distance in ... (i)... from the intended position within which flights would be for at least ...(ii)... of the total flying time.

(i) nautical miles

(ii) 95%

17. According to Annex 6, what is the definition of Required Navigation Performance (RNP)?

A statement of the navigation performance necessary for operation within a defined airspace

18. In a Satellite-Assisted Navigation system (GNSS/GPS) a position line is obtained by:

Timing the period that is taken for a satellite's transmission to reach the aircraft's receiver

19. In which frequency band do Satellite-Assisted Navigation systems (GNSS/GPS) provide position information that is available to civil aircraft?

UHF

20. What is the minimum number of satellites required for a Satellite-Assisted Navigation System (GNSS/GPS) to carry out two dimensional operations?

3

21. Which of the following lists are all errors that affect the accuracy and reliability of the Satellite-Assisted Navigation system (GNSS/GPS)?

Satellite clock; satellite ephemeris; atmospheric propagation

22. Signal reception is required from a minimum number of satellites that have adequate elevation and suitable geometry in order for a Satellite-Assisted Navigation System (GNSS/GPS) to carry out independent three dimensional operations, Receiver Autonomous Integrity Monitoring (RAIM) and to isolate any faulty satellite and remove it from contributing to the navigation solution. The number of satellites is:

6

23. In a Satellite-Assisted Navigation System (GNSS/GPS), a fix is obtained by:
Measuring the time taken for a minimum number of satellites' transmissions, in known positions, to reach the aircraft's receiver

24. The correction for an aircraft GNSS receiver in EGNOS and WAAS systems are broadcasted:
Via a geostationary satellite

25. What are the characteristics of a satellite based augmentation system?
It increases accuracy in a wide area to allow approaches to a minimum comparable with a ILS CAT I approach

26. EGNOS (European Geostationary Navigation Overlay System) is a form of:
Wide Area Differential GPS (WADGPS)

27. In respect of the use of GNSS, Dilution of Precision (DOP) is a loss of accuracy due to:
Relative position of the visible satellites

28. Which of the following statements concerning augmentation systems is true?
An augmentation system can only enhance preexisting position information of a GNSS

29. Which of the following lists all the parameters that can be determined by a GPS receiver tracking signals from 4 different satellites?
Latitude, longitude, altitude and time

30. The satellites of the GPS system orbit the earth approximately:
Twice per day

31. In the GPS system Receiver Autonomous Integrity Monitoring (RAIM)
Means that the receiver evaluates the signals from 5 satellites and discards the signals from a satellite exhibiting anomalous pseudo range errors

32. In relation to the NAVSTAR/GPS satellite navigation system, what is involved in the differential technique (D-GPS)?
Fixed ground stations compute position errors and transmit correction data to a suitable receiver on the aircraft

33. What is meant by "Map Data"?
The best match between the real form of the earth, compared to the ellipsoid, in a certain area of the world, for the purpose of drawing exact maps

34. What is meant by "WGS 84"?
Complete map coverage of the earth, being the basis for GPS navigation

35. The required 24 NAVSTAR/GPS operational satellites are located on:
6 orbital planes with 4 satellites in each plane

36. Which of the following statements is correct concerning the principle behind the correction of one of the NAVSTAR/GPS satellite navigation system errors by the transmission of the signals on two frequencies (L1 and L2)?
The path delay of the signals in the earth atmosphere is proportional to the inverse of the carrier frequency squared

37. How many operational satellites are required for Full Operational Capability (FOC) of the satellite navigation system NAVSTAR/GPS?

24

38. Concerning the NAVSTAR/GPS satellite navigation system, what is the meaning of the term 'Receiver Autonomous Integrity Monitoring' (RAIM)?

It is a technique by which a receiver ensures the integrity of the navigation information

39. What type of satellite navigation system NAVSTAR/GPS receiver is most suitable for use on board an aircraft?

Multichannel

40. What is the minimum number of NAVSTAR/GPS satellites required to produce an accurate independent 3-D position fix?

4

41. In the NAVSTAR/GPS satellite navigation system, receiver clock error:

Is corrected by using signals from four satellites

42. The orbital planes of the satellite navigation system NAVSTAR/GPS are:

Inclined 55° to the equatorial plane

43. One of the tasks of the space segment of the satellite navigation system NAVSTAR/GPS is to:

Transmit signals which can be used, by suitable receivers, to determine time, position and velocity

44. The geometric shape of the reference system for the satellite navigation system NAVSTAR/GPS, defined as WGS 84, is:

An ellipsoid

45. In civil aviation, the height value computed by the receiver of the satellite navigation system NAVSTAR/GPS is the:

Height above the WGS-84 ellipsoid

46. How long does it take a NAVSTAR/GPS satellite to orbit the earth?

Approximately 12 hours (1/2 of a sidereal day)

47. In relation to the satellite navigation system NAVSTAR/GPS, 'All in View' is a term used when a receiver:

Is tracking more than the required 4 satellites and can instantly replace any lost signal with another already being monitored

48. The influence of the ionosphere on the accuracy of the satellite navigation system NAVSTAR/GPS is:

Minimised by the receiver using a model of the atmosphere and comparing signals transmitted by the satellites

49. What is the function of the control segment in GPS NAVSTAR?

To ensure that the transmitted data of the satellites is controlled and updated from time to time by ground stations

50. One of the tasks of the GPS control segment is:

To determine and send new ephemeris and new satellite clock errors data to the GPS satellites

51. What are the data elements transmitted by NAVSTAR GPS satellites?

1) Offset of the satellite clock from UTC
2) Ephemeris data
3) Health data
4) Ionospheric delays
~~5) Solar activity~~

The combination the regroups all of the correct statements are:

1, 2, 3, 4

52. In a Satellite-Assisted Navigation system (GNSS/GPS) a position line is obtained by:

Timing the period that is taken for a satellite's transmission to reach the aircraft's receiver

53. Which of the following coordinate systems is used by the GPS receiver to determine position (Latitude, longitude and altitude)?

WGS 84

54. What datum is used for the Minimum Descent Altitude (MDA) on a non-precision approach when using the NAVSTAR/GPS satellite navigation system?

Barometric altitude

55. Which of the following system are considered augmentation systems?

LAAS, WAAS, EGNOS

56. The ground routing of the ATC datalink communications is performed:

By service providers (SITA, ARINC...) that can be interconnected to provide continuity of the transmissions

57. Select the correct answer:

ARINC 424 specifies the format of navigation databases

58. The system notifying in advance the circumstances requiring important changes in the methods of operation, based on common effective dates, is identified by the acronym:

AIRAC

59. An AIRAC is:

An Acronym for a system aimed at advance notification based on common effective dates, of circumstances necessitating significant changes in operating procedures

60. Operationally significant changes to the AIP published at a specific date are called:

AIRAC

61. A notice providing information on Rules of the Air, Air Traffic Services and Air Navigation Procedures and distributed in advance of its effective date is:

An AIRAC

62. At what approximate height above the WGS-84 ellipsoid are GLONASS satellites circling the earth?
19100 km

63. At what approximate height above the WGS-84 ellipsoid are NAVSTAR/GPS satellites circling the earth?
20200 km

64. In civil aviation, the height value computed by the receiver of the satellite navigation system NAVSTAR/GPS is the:
Height above the WGS-84 ellipsoid

65. How does a receiver of the NAVSTAR/GPS satellite navigation system determine the elevation and azimuth data of a satellite relative to the location of the antenna?
It calculates it by using Almanac data transmitted by the satellites

66. How does a NAVSTAR/GPS satellite navigation system receiver recognise which of the received signals belongs to which satellite?
Each satellite transmits its signal, on common frequencies, with an individual Pseudo Random Noise code

67. What is cross track distance (XTK distance) in an Area Navigation System?
Distance between actual position and great circle track between active waypoints

68. To fly an RNAV GNSS Approach, the aircraft and all GNSS receivers and associated equipment must be certified. For aircraft registered in Switzerland, the certification status is to be found:
In the Attachment to the Airworthiness Certificate

69. RNAV GNSS Approach certified GNSS receivers include:
Equipment and aircraft installations meeting the airworthiness requirements for the intended operation

70. Which of the following does not apply?
Before planning any RNAV GNSS Approach, it is the pilots' duty to check:
RNAV GNSS Approaches shall be planned for destination and alternate aerodrome approaches

71. Before planning any RNAV GNSS Approach, it is the pilots' duty to ensure that:
The RAIM is checked (if applicable) to provide sufficient satellite coverage for the estimated arrival time (ETA) +/- 15 minutes

72. During cruise, the pilot shall:
Select the display to show at least Desired Track, Ground Speed, and Distance to next Waypoint

73. Before reaching the Initial Approach Fix, the pilot shall:
Check that the CDI/HSI navigation indicator source is set to the GPS sensor system

74. Before commencing the approach and before reaching the FAF, the pilot shall:
Perform a cross error check towards ground based navigation aids where possible

75. During the RNP Approach, the pilot shall:

Fly a continuous descent final approach (CDFA) with a rate of descent as indicated by the correctly programmed APV system (where vertical guidance is available) or as calculated with reference to ground speed (if no vertical guidance is available) and compare altitude versus distance against charted values

76. Check the following statements for correctness:

RNAV GNSS approaches will be handled by Air Traffic Service Units (ATSU) in the same way as other NPAs

77. Check the following statements for correctness:

Air Traffic Controllers shall instruct the pilot to report at the Final Approach Fix

78. Check the following statements for correctness:

Following a RAIM indication, pilots shall inform the controller of the event and subsequent intentions

79. Check the following statements:

1) Unlike the lateral monitoring and obstacle clearance for barometric VNAV systems, there is no alerting on vertical position error. Therefore, barometric VNAV is not considered vertical RNP

2) On-board performance monitoring and alerting is the main element that determines if the navigation system complies with the necessary safety level associated to an RNP application.

1) is correct, 2) is correct

80. Check the following statements:

1) At the basic level, functional requirements for RNAV and RNP may include display of distance and bearing to the active (To) waypoint

~~2) At the basic level, functional requirements for RNAV and RNP may include display of indicated airspeed or time to the active (To) waypoint~~

1) is correct, 2) is incorrect

81. Check the following statements with regard to Barometric VNAV without temperature compensation:

~~1) Cold temperatures increase the actual glide path angle, while high temperatures reduce the actual glide path angle~~

2) Aircraft using an alternate means for vertical guidance (e.g. SBAS) may disregard the temperature restrictions

1) is incorrect, 2) is correct

82. Check the following statements:

~~1) Remote altimeter settings are allowed under certain circumstances~~

2) When cold weather temperatures exist, the pilot should check the chart for the instrument approach procedure to determine the limiting temperature for the use of Barometric VNAV capability

1) is incorrect, 2) is correct

83. With regard to operations predicated on the use of Barometric VNAV capability:

At least one RNAV system is required