Navigation Question Bank

THE EARTH

1. Which of the following statements is true of a great circle?

a) It is the path radio waves that travel over the Earth

b) The smaller arc of it represents the shortest distance between two points on the Earth

c) Its plane passes through the center of the Earth

d) All of these

2. Which of the following statements is false of a small circle?

a) A radio wave never follows a small circle path

b) The smaller arc of it does not represent the shortest distance between two points on the Earth

c) Its plane does not pass through the center of the Earth

d) All lines of latitude are small circles

3. The latitude of a place is its angular distance:

a) N/S of the Equator to a maximum of 180◦ N/S

b) E/W of the Equator to a maximum of 90◦ E/W

c) N/S of the Equator to a maximum of 90◦ N/S

d) E/W of the Equator to a maximum of 180◦ E/W

4. The dlat and dlong between A (64◦33'S 120◦36'W) and B (10◦27'N 113◦24'E) is:

dlat dlong

a) 75◦00' 126◦00'

b) 54◦06' 07◦12'

c) 75◦00' 07◦12'

d) 54◦06' 126◦00'

5. Which of the following statements is false about a rhumb line?

a) It is a line of constant direction on the Earth's surface

b) All lines of latitude Rhumb lines but not great circles

c) All meridians are Rhumb lines and semi great circles

d) If the Rhumb line bearing of A from B is 090◦(T), the Rhumb line bearing of B from A is 270◦(T)

6. Which of the following statements about Earth convergency is false?

a) It is the angle that any two meridians converge on the Earth

b) It is the angle that a great circle bearing changes as it passes across two meridians

c) The angle of Earth convergency between meridians at the Equator is dlong

d) The angle between two meridians at the pole is dlong

7. The formula for Earth conversion angle is:

a) 2 x Earth Convergency

b) ½ dlong x sine Mean Latitude

c) dlong x sine Mean Latitude

d) dlong x cosine Mean Latitude

8. Which of the following statements about departure is false?

a) It is measured in nautical miles

b) It is the distance E/W between two meridians

c) Its formula is dlong x sine lat

d) Its value at the Equator is dlong converted to minutes of arc

9. C is in the same hemisphere as D. The Great Circle bearing of D from C is 044◦(T) and of C from D is 220◦(T). The hemisphere of C and D, and the Rhumb line track from C to D are:

Hemisphere	Rhumb Line C to D
a) Northern	040◦
b) Southern	**042◦**

c) Southern 044◦

d) Northern 046◦

10. The Great Circle track from A (20◦00’N 10◦00’W) to B (40◦00’N 175◦00’E) is 060◦(T). The Great Circle track from A to B is:

a) 240◦(T)

b) 245◦(T)

c) 250◦(T)

d) 230◦(T)

11. Calculate the convergency of meridians between 30◦North 175◦East and 30◦North 165◦West to the nearest whole degree

a) 5◦

b) 10◦

c) 17◦

d) 9◦

12. A is at 5500N 15100W and B at 5500N 16253W. what is departure?

a) 584 NM

b) 397 NM

c) 567 NM

d) 409 NM

13. Consider the following statement on the shape of the Earth:

a) The diameter of the Earth is the same at all latitudes

b) The longest diameter is between the poles

c) It is slightly flattened at the poles

d) The diameter at the Equator is about 60 NM longer than the diameter between poles

14. Consider the following statement on the longitude:

a) Longitude is stated in degrees upto 360◦

b) The value of longitude will never exceed 90◦

c) The largest value of longitude is 180◦

d) The largest value of change of longitude is 90◦

Navigation Question Bank

DICS

DIRECTIONS, MAGNETISM AND SPEED

1. Directions are stated:

a) As a reference direction and a number of degrees

b) In degrees with reference to True North when plotted with reference to the latitude/longitude grid on a chart

3. c) In degrees in a 360◦ system, starting out clockwise from the reference direction

4. d) All 3 answers are correct

2. The angular difference between Compass North and Magnetic North is:

a) Variation

b) Deviation

c) Inclination

d) Magnetic Correction

3. The angular difference between the geographical meridian and magnetic meridian running through the same position is:

a) Variation

b) Deviation

c) Inclination

d) Magnetic Correction

4. Given Variation 6◦E, Deviation 4◦W, Heading 136◦True. What is the compass heading?

a) 130

b) 138

c) 134

d) 126

5. Variation in a position is 13◦W, and True track is 136◦. Consider the following statements:

a) The compass track is 149◦

b) The magnetic track is 149◦

c) Looking North from this position, ther Magnetic North pole seems to be located to the east of the true north pole

d) The position most likely is located at northern latitudes and on eastern latitudes

6. In the areas close to the magnetic poles, magnetic compasses are not to any use in air navigation, mainly because:

a) The field strength of the Earth's magnetic field is at it's weakest in this area

b) The distance from the Magnetic Equator is too long

c) The horizontal component of the Earth's magnetic field is too weak

d) The inclination is insufficient in these areas

7. The red end of a direct reading compass needle will point:

a) North and upwards in the northern hemisphere

b) North and upwards in the southern hemisphere

c) South and downwards in the southern hemisphere

d) South and upwards in the southern hemisphere

8. Dip is the angle between:

a) The H and Z components measured from the vertical

b) The Z component and the earth's magnetic field measured upwards

c) The H and Z components measured from the horizontal

d) The H component and the earth's magnetic field measured from the horizontal

9. True Heading is 355◦(T), Variation is 12◦W, Compass Heading is 002◦(C). The magnetic heading of the aircraft is ——- and the deviation is ———

a) 343◦(M) 7◦W

b) 343◦(M) 19◦E

c) 007◦(M) 5◦W

d) 007◦(M) 5◦E

10. Compass Heading is 237◦(C), magnetic heading is 241◦(M) with the variation 12◦W:

a) Deviation is 4◦W and True North is east of Compass North

b) Deviation is 4◦E and Compass North is west of True North

c) Deviation is 4◦W and Magnetic North is east of Compass North

d) Deviation is 4◦E and True North is west of Compass North

Navigation Question Bank

THE TRIANGLE OF VELOCITIES

1. Consider the following statements:

a) The exact length of a 1’ of arc is longer at high altitude than at sea level, when the arc is observed from the centre of the Earth

b) In any position on the surface of the Earth, the length of 1’ of arc East/West is equal to the length of 1’ of arc North/South in the same position on a perfect sphere

c) The exact length of a 1’ of arc varies a little from position to position because the Earth radius vary

d) All 3 statements are correct

2. Given True course 300◦, Drift 8◦R, Variation 10◦W, Deviation -4◦. Calculate compass heading?

a) 306◦

b) 322◦

c) 294◦

d) 278◦

3. 1 Nautical Mile equals:

a) 1855 metres

b) 6076 feet

c) 0.869 Statute Mile

d) 3281 Yards

4. Given Drift angle 4◦R, Magnetic Variation 8◦W, Magnetic Heading 060◦. What is the true track?

a) 072◦

b) 064◦

c) 048◦

d) 056◦

5. 265 US-GAL equals: (Specific gravity 0.80)

a) 862 kg

b) 895 kg

c) 940 kg

d) 803 kg

6. Kilometre is defined as:

a) The mean length of a 1/40000 part of the Equator

b) A 1/10000 part of the meridian length from Equator to the pole

c) 0.621 Statute Mile

d) 0.454 Nautical Mile

7. Construct the triangle of velocities showing the following data: TH 305◦, TAS 135 kt W/V 230/40, Period of time from 1130 to 1145. What is the track in this period of time?

a) 310◦

b) 290◦

c) 322◦

d) 316◦

8. Given TAS 110 kt, True heading 020◦, Actual wind 330◦(T)/36 kt. Calculate the drift angle and GS.

a) 15◦ Left – 97 kt

b) 15◦ Right – 97 kt

c) 17◦ Right – 91 kt

d) 17◦ Left – 91 kt

9. Construct the triangle of velocities showing the following data: TH 305◦, TAS 135 kt W/V 230/40, Period of time from 1130 to 1145. What is the GS in this period of time?

a) 130 kt

b) 135 kt

c) 145 kt

d) 97 kt

10. Flying on a true heading of 207◦, TAS is 158 kt, W/V is 310/25. Calculate true track.

a) 190◦

b) 215◦

c) 207◦

d) 198◦

11. Given TAS 290 kt, True heading 070◦, Actual wind 010◦(T)/40 kt. Calculate the drift angle and GS.

a) Drift angle 8◦ Left, GS 273 kt

b) Drift angle 7◦ Right, GS 260 kt

c) Drift angle 7◦ Right, GS 273 kt

d) Drift angle 7◦ Left, GS 273 kt

CHARTS

1. If an earth distance of 100NM is represented on a chart by a line 7.9 inches long, the length of a line in inches representing 50 km is:

a) 2.00

b) 2.13

c) 2.18

d) 2.20

2. A what distance in mm would 2 fixes taken 20 minutes apart appear on a 1:1 000 000 Scale chart if the GS was 180 kt.

a) 108

b) 96

c) 111

d) 103

3. A Mercator has a scale of 1:6 000 000 at the Equator. How many statute miles are represented by 5 inches at 60◦S?

a) 948

b) 474

c) 237

d) 711

4. A straight line drawn on a chart measures 5.827 inches and represents 148 km. The chart scale is:

1. a) 1:500 000
2. **b) 1:1 000 000**
3. **c)** 1:1 500 000
4. d) 1:2 000 000

5. On a constant scale chart 1.28 inches represents 88 NM. The scale is:

a) 1:2 000 000

b) 1:5 000 000

c) 1:100 000

d) 1:1 500 000

6. On a Mercator chart the distance between 60◦N 017◦W and 60◦N 019◦W is 8 inches. The chart distance between 00◦N/S 017◦W and 00◦N/S 019◦W would be:

a) 4 inches

b) 8 inches

c) 16 inches

d) 9.24 inches

7. The scale of a chart is 1:730 000. How many cm on the chart are equivalent to 37 NM on the Earth?

a) 3.2

b) 0.3

c) 9.4

d)10.6

8. The scale of a chart is 1:500 000. How many inches on the chart are equivalent to 127 km on the Earth?

a) 100

b) 10

c) 18.5

d)24.5

9. A straight line on a chart of 9 inches is equivalent to 432 NM on the Earth. The chart scale is:

a) 1:2 000 000

b) 1:2 500 000

c) 1:5 000 000

d) 1:3 500 000

10. A straight line on a chart of 25.4 cm is equivalent to 137 NM. What is the scale?

a) 1:1 000 000

b) 1:500 000

c) 1:1 500 000

d) 1:2 000 000

11. The scale of a chart is 1:185 320. A straight line drawn on this chart is 15 cm. What is the equivalent length of this line on the Earth in NM?

a) 25

b) 30

c) 15

d) 45

12. The scale of a chart is 1:729 600. A straight line drawn on this chart is 8.9 cm. What is the equivalent length of this line on the Earth in NM?

a) 29

b) 35

c) 45

d) 60

13. Chart convergency on a Mercator chart is:

a) ½ dlong x Sin Lat

b) dlong x Cos Lat

c) zero

d) dlong x Cos parallel of origin

14. On a Mercator chart, chart convergency equals earth convergency:

a) At the parallel of origin

b) At the Equator

c) At the parallel of tangency

d) All of these

15. On a Mercator chart the scale at 60◦ south compared with the scale at 30◦ south is:

a) Greater

b) The same

c) Smaller

d) 1/3 smaller

16. On a Mercator chart a rhumb line is:

a) A curve concave to the Pole

b) A curve concave to the Equator

c) A straight line

d) A curve concave to the central meridian

17. On a Mercator chart a great circle between two points is:

a) A straight line

b) A curve convex to the nearer pole

c) A curve convex to the Equator

d) Always on the equatorial side of the rhumb line between them

18. The scale of a Mercator chart is 1:5 000 000 at its parallel of origin. What is the scale at 60◦ North?

a) 1:10 000 000

b) 1:7 500 000

c) 1:5 000 000

d) 1:2 500 000

19. The scale of a Mercator chart is 1:4000 000 at 30◦ North. What is the scale at 60◦ North?

a) 1:200 000

b) 1:230 000

c) 1:695 000

d) 1:800 000

20. The scale of a Mercator chart is 1:730 000 at the Equator. What is the chart length to the nearest inch between meridians 3 degrees apart at 481/2◦ North?

a) 2

b) 18

c) 180

d) 20

21. On a Mercator chart the rhumb line track from A (20◦S 20◦W) to B (40◦S 40◦W) is 220◦(T). What is the great circle bearing of A from B?

a) 035◦(T)

b) 215◦(T)

c) 045◦(T)

d) 225◦(T)

22. On a Lamberts chart, chart convergency equals earth convergency:

a) At the Equator

b) The Poles

c) At the standard parallels

d) At the parallel of origin

23. On a Lamberts chart, the true appearance of a great circle (other than a meridian) is:

a) A straight line

b) A curve convex to the nearer pole

c) A curve convex to the parallel of origin

d) A curve concave to the parallel of origin

24. On a Lamberts chart, the published scale is correct:

a) At the Equator

b) The Poles

c) At the standard parallels

d) At the parallel of origin

25. On a Lamberts chart, scale is least:

a) At the Equator

b) The Poles

c) At the standard parallels

d) At the parallel of origin

26. The chart convergency on a Lamberts conical conformal chart is stated as being equal to the change of longitude x 0.5. A straight line track drawn on this chart from A (30◦S 107◦W) to B (42◦50'S 125◦W) measures 224◦(T) at A. Calculate: The approximate rhumb line track from A to B is:

a) 233 ½◦(T)

b) 228 ½◦(T)

c) 219 ½◦(T)

d) 215◦(T)

27. The Great Circle bearing of A from B in Q 26 is:

a) 054◦(T)

b) 045◦(T)

c) 036◦(T)

d) 049.5◦(T)

28. The constant of the cone of a Lamberts conical conformal chart is given as 0.75. A straight line drawn from C (45◦N 60◦W) to E in 10◦W passes through D in 28◦W. The direction of the track is 055◦(T) at C. Calculate: The direction of the straight line track C to E, measured at D, is:

a) 067◦(T)

b) 079◦(T)

c) 055◦(T)

d) 031◦(T)

29. The approximate rhumb line track from C to D is:

a) 067◦(T)

b) 079◦(T)

c) 055◦(T)

d) 043◦(T)

30. The approximate rhumb line track from C to E is:

a) 098◦(T)

b) 036◦(T)

c) 093◦(T)

d) 074◦(T)

31. The approximate rhumb line track from D to E is:

a) 062◦(T)

b) 086◦(T)

c) 074◦(T)

d) 072◦(T)

32. A straight line track is drawn on a polar stereographic chart from A (85◦N 80◦W) to B (85◦N 130◦E). Calculate: The track angle (◦T) A to B measured at A is:

a) 345

b) 015

c) 165

d) 195

33. The track angle (◦T) B to A measured at B is:

a) 345

b) 015

c) 165

d) 195

34. The track angle (◦T) A to B measured at 180◦E/W is:

a) 065

b) 085

c) 245

d) 155

35. The longitude at which the track angle A to B measures 270◦(T) is:

a) 035◦E

b)155◦E

c) 035◦W

d) 155◦W

36. For gyro steering purposes a polar stereographic chart is overlaid with a rectangle grid aligned with the Greenwich (prime) meridian. The Track angle, expressed in degrees grid, when the aircraft is at position 82◦N 113◦W on a track of 205◦(T) is:

a) 318

b) 113

c) 092

d) 138

37. For gyro steering purposes a polar stereographic chart is overlaid with a rectangle grid aligned with the Greenwich (prime) meridian. The Track angle, expressed in degrees grid, when the aircraft is at position 70◦N 60◦E on a track of 090◦(T) is:

a) 150

b) 030

c) 330

d) 210

38. An aircraft at DR position 66◦N 29◦W obtains an ADF bearing of 141◦ (relative) from an NDB at position 64◦N 22◦W. The aircraft heading is

352◦(M), the variation at the NDB is 15◦W and at the aircraft 12◦W. Calculate: The bearing to plot, on a Mercator chart, from the meridian passing through the NDB:

a) 124◦

b) 298◦

c) 304◦

d) 308◦

39. The bearing to plot, on a polar stereographic chart, from the meridian passing through the NDB:

a) 121◦

b) 294◦

c) 301◦

d) 308◦

40. The bearing to plot, on a Lamberts conformal conic chart having standard parallels at 37◦N and 65◦N, from the meridian passing through the NDB is:

a) 126 ½◦

b) 306 ½◦

c) 295 ½◦

d) 304◦

41. An aircraft at DR position 63◦S 47◦E obtains an RMI reading of 228 from a VOR at position 67◦S 39◦E. The aircraft heading is 025◦(M), the variation at the VOR is 15◦E and at the aircraft 11◦E. Calculate: The position line to plot, on a Mercator chart from the meridian passing through the VOR is:

a) 055 ½◦

b) 056◦

c) 059 ½◦

d) 066 ½◦

42. The position line to plot, on a polar stereographic chart from the meridian passing through the VOR is:

a) 048◦

b) 059◦

c) 063◦

d) 033◦

43. The position line to plot, on a Lamberts conformal conic chart having a parallel of origin at 55◦S, from the meridian passing through he VOR is:

a) 048◦

b) 059◦

c) 063◦

d) 033◦

44. A Lamberts conformal conic chart and a transverse Mercator chart covering the same area of the Earth's surface both have nominal scale of 1:3 000 000. The standard parallels of the Lamberts chart are at 25◦N and 45◦N and the central meridian of the transverse Mercator chart is 40◦E. Using this information, answer the following: At position 50◦N 40◦E:

a) The Lambert chart has the larger scale

b) The transverse Mercator has the larger scale

c) Both charts have the same scale

d) Insufficient information is given to answer this question

45.At position 25◦N 50◦E:

a) The Lambert chart has the larger scale

b) The transverse Mercator has the larger scale

c) Both charts have the same scale

d) Insufficient information is given to answer this question

46.At position 30◦N 30◦E:

a) The Lambert chart has the larger scale

b) The transverse Mercator has the larger scale

c) Both charts have the same scale

d) Insufficient information is given to answer this question

47.At position 45◦N 40◦E:

a) The Lambert chart has the larger scale

b) The transverse Mercator has the larger scale

c) Both charts have the same scale

d) Insufficient information is given to answer this question

48.On a polar stereographic chart, Earth convergency is correctly represented:

a) At all points on the chart

b) At the Equator

c) At the pole

d) At the meridian of tangency

49. On a polar stereographic chart, a straight line is drawn from 70◦S 115◦W to 70◦S 125◦E. Using this information, answer the following: The initial direction (◦T) of this straight line track is:

a) 330

b) 060

c) 130

d) 210

50. The final direction (◦T) of this straight line track is:

a) 210

b) 330

c) 060

d) 130

51. The longitude of the most southerly point on the straight line track is:

a) 175◦W

b) 180◦E/W

c) 175◦E

d) 165◦W

52. On the chart, the most southerly point on this straight line track will appear to be:

a) At a lower latitude than 80◦S

b) At 80◦S

c) At a higher latitude than 80◦S

d) At a higher latitude than 85◦S

53. For gyro steering purposes a polar stereographic chart is overlaid with a rectangle grid so that 000◦(G) coincides with 000◦(T) along the 060◦E meridian. The track angle expressed in ◦(G), at position 80◦N 10◦W with the aircraft making good a track of 300◦(M), local magnetic variation 25◦E, is:

a) 255

b) 335

c) 345

d) 035

54. With an aircraft on a heading of 125◦(T) the relative bearing of an NDB is determined as 310◦. Given that the difference in longitude between the aircraft and the NDB is 6◦ and that the mean latitude between the aircraft and NDB is 68◦S, answer: The bearing to plot, on a Mercator chart, from the meridian passing through the NDB is:

a) 252◦

b) 255◦

c) 258◦

d) 261◦

55. The bearing to plot, on a polar stereographic chart, from the meridian passing through the NDB is:

a) 255◦

b) 261◦

c) 252◦

d) 249◦

56. The bearing to plot, on a Lamberts conformal conic chart (parallel of origin 48◦S), from the meridian passing through the NDB is:

a) 249◦

b) 255◦

c) 250 ½◦

d) 259 ½◦

SOLAR SYSTEM and TIME

1. What is the UTC/GMT of sunset in Hong Kong (22◦19N 114◦ 12◦E) on 24th July?

a) 0221 25th July

b) 1044 24th July

c) 1107 24th July

d) 0244 25th July

2. Given the ST of the beginning of Evening Civil Twilight at Port Stanley (Falkland Islands) (51◦42’S 57◦ 51’W) on 23rd July?

a) 1613 23rd July

b) 1713 23rd July

c) 1539 23rd July

d) 1629 23rd July

3. The times of sunrise, sunset as given in the Air Almanac are with reference to:

a) LMT for the observer’s meridian

b) ST for the observer’s meridian

c) GMT for the observer’s meridian

d) UTC for the observer’s meridian

4. In the Air Almanac twilight tables, the symbol //// means that:

a) Twilight lasts all day

b) The sun remains continuously above the horizon

c) The sun remains continuously below the horizon

d) Twilight lasts all night or day

5. The LMT of sunrise at Lat 00◦30’S Long 47◦20’W on 4th December is:

a) 0451 LMT

b) 0640 LMT

c) 0256 LMT

d) 0545 LMT

6. The LMT of the beginning of evening civil twilight at Lat 50◦00’S Long 120◦15’E on 25th December is:

a) 1641 LMT 25th December

b) 2055 LMT 25th December

c) 0412 LMT 26th December

d) 2011 LMT 25th December

7. The LMT of sunrise at 35◦00’S 28◦00’E on 4th December is:

a) 0410

b) 0439

c) 0621

d) 0652

8. The GMT of Evening Civil Twilight at 46◦19’N 035◦34’E on 26th July is:

a) 1751

b) 2238

c) 1754

d) 2016

9. The duration of Morning Civil Twilight at 66◦48’N 095◦26’W on 2nd December is:

a) 94 min

b) 90 min

c) 84 min

d) 80 min

10. The Standard Time of sunset at Hong Kong (22◦20’N 114◦ 10’E) on 31st Dec is:

a) 0126 1st Jan

b) 1726 31st Dec

c) 1749 31st Dec

d) 1759 31st Dec

11. The LMT of the end of Evening Civil Twilight in latitude 71◦00’N on 19th Dec is:

a) 1330

b) 1301

c) 1350

d) 1400

12. For an observer in the Norfolk Island (29◦00’S 167◦55’E) the LMT of sunset on 16th July is:

a) 1900

b) 1720

c) 1742

d) 1927

13. For an observer in the Lord Howe Island (31◦31'S 159◦04'E) the LMT of sunrise and the duration of morning civil twilight on the 6th August are:

	UNRISE	DURATION
a)	0519	34 min
b)	0647	25 min
c)	0503	34 min
d)	**0644**	**25 min**

14. The duration of Evening Civil Twilight at Moscow (56◦00'N 037◦23'E) on the 14th December was:

a) 13

b) 37

c) 47

d) 42

15. A flight departed Boston (Massachusetts, USA, 42◦22'N 071◦00'W), two hours after sunset on 16th September. The flight time to Brussels (Belgium, 50◦55'N 004◦31'E) was 6 hours 30 minutes. The UTC time and date of departure was:

a) 16th 2023

b) 17th 0053

c) 17th 0823

d) 16th 1224

16. The UTC of sunrise at 54◦00'N 010◦00'E on 10th July is:

a) 0308

b) 0224

c) 0300

d) 0344

17. In Hong Kong (22◦19’N 114◦12’E), the UTC of sunset on 24th July is:

a) 0221 25th July

b) 1044 24th July

c) 1107 24h July

d) 0244 25th July

18. For an observer at 62◦50’N 048◦57’W on the 7th July, the local time of sunrise is:

a) 0208

b) 0524

c) 2252

d) does not rise

19. An observer in Korea (38◦00’N 133◦00’E) watches the sunset on 13th August local date. The duration of evening civil twilight would be:

a) 25 min

b) 38 min

c) 27 min

d) 20 min

20. An observer in Korea (38◦00'N 133◦00'E) watches the sunset on 13th August local date. The time of sunset expressed as GMT would be:

a) 0350 14th

b) 0350 13th

c) 1006 13th

d) 1006 14th

21. An observer in Korea (38◦00'N 133◦00'E) watches the sunset on 13th August local date. The time of sunset expressed as Standard Time would be:

a) 1906 14th

b) 1858 14th

c) 1858 13th

d) 1906 13th

22. In its path around the Sun, the axis of the Earth has an inclination:

a) Varying between zero and 23◦27' with the plane of the path

b) Of 66◦33' with the plane

c) Varying with the season of the year

d) Of 23◦27' with the plane of Equator

23. The Sun's declination is on a particular day 12.00 S. Midnight Sun may this day be observed:

a) North of 7800S

b) South of 7800S

c) At 7800S only

d) North of 7800N

24.The term ‘sidereal’ is used:

a) To describe how two positions of heavenly bodies are located sideways on the sky

b) To describe conditions with reference to the moon

c) To describe a situation or relationship concerning the stars

d) To describe the time interval between two successive transits of the real apparent Sun at the same meridian

25.The mean Sun:

a) Is the middle position of the Sun

b) Has a declination equal to the apparent Sun

c) Moves with constant speed along the celestial Equator

d) Is only of interest to users of astronomical navigation

26.A day at a place as measured in local mean time starts:

a) When the mean sun transits the meridian of the place in question

b) When the mean sun transits the Greenwich meridian

c) When the mean sun transits the anti meridian of the place in question

d) When the mean sun transits the 180E/W meridian

27.The inclination of the Earth’s axis of rotation with the plane of the ecliptic:

a) Is causing the variation of length of the day during a year

b) Is stable throughout the year

c) Is causing the seasons, summer and winter

d) All 3 answers are correct

28. As seen from an observer on the surface of the Earth:

a) The sun is in a fixed position relative to the stars

b) The stars will seem to move from west to east during a year

c) The sun's position relative to the stars is fixed throughout the year

d) The apparent sun is always in the plane of the ecliptic

29. If the Mean Sun moves 121◦ 30' along the Equator, that equals:

a) 20 hours 10 minutes

b) 9 hours 15 minutes

c) 6 hours 20 minutes

d) 8 hours 06 minutes

30. The direction of the Earth's rotation on its axis is such that:

a) Observed from the point above the North Pole, the rotation is counterclockwise

b) An observer on the surface of the Earth always will face west when observing sunrise

c) Any point on the surface of the Earth will move eastward

d) Any point on the surface of the Earth will move westward

31. When the Sun’s declination is northerly:

a) It is winter on the Northern Hemisphere

b) The sunrise occurs earlier at southern latitudes than northern latitudes

c) The daylight period is shorter on the Southern Hemisphere

d) Midnight sun may be observed at the South Pole

32. The length of an apparent solar day is not constant because:

a) The Earth’s speed in its orbit varies continuous, due to the orbit being elliptical

b) The Earth’s speed of rotation is not the same at all latitudes

c) The Sun’s declination is not constant

d) The Earth is moving with constant speed around the Sun

33. By the term ‘transit’ of a heavenly body it is understood that:

a) The body is moving

b) The body is passing the meridian of the observer or another specified meridian

c) The body is passing the anti meridian of the observer

d) The body is at the same celestial meridian as another body

34. Atmospheric refraction:

a) Causes the sunrise and the sunset to occur earlier

b) Causes the sunrise and the sunset to occur later

c) Causes the sunrise to occur later and the sunset to occur earlier

d) Causes the sunrise to occur earlier and the sunset to occur later

35. When approaching the International Date Line from East longitude, you:

a) Should be prepared to increase your date by 1

b) Should increase your date by an extra date at the first midnight you experience

c) Should be prepared to decrease your date by 1

d) Should not change date at the first midnight you experience

36. The duration of twilight:

a) Will in the period around the Equinoxes increase as you approach the Equator from North or South

b) Is generally longer in positions at high latitudes than in positions at lower positions

c) Is independent of the sun's declination and only depends on the observer's latitude and longitude

d) Is longer in the morning than in the evening because of the refraction in the atmosphere

PRACTICAL NAVIGATION

1. A ground feature is observed in line with the wing tip whilst flying at 300 kt GS. After 5 minutes the same feature is 7◦ behind the wing tip. What is the aircraft distance from the ground feature? (Use 1:6 rule)

a) 230 NM

b) 214 NM

c) 150 NM

d) 164 NM

2. A fix indicates you are 70 NM from a ground feature that is in line with the wing tip. After 2 minutes the same feature is 3◦ behind the wing tip. What is your Ground Speed? (Use 1:6 rule)

a) 125 kt

b) 154 kt

c) 105 kt

d) 251 kt

3. A fix indicates you are 52 NM from a ground feature that is in line with the wing tip Whilst flying at 210 knots. After 1 minute how many degrees behind the wing will You see the ground feature? (Use 1:6 rule)

a) 4◦

b) 7◦

c) 8◦

d) 3◦

4. A ground feature is observed in line with the wing tip whilst flying at 180 kt GS. After 4 minutes the same feature is 5◦ behind the wing tip. What is the aircraft distance from the ground feature? (Use 1:6 rule)

a) 155 NM

b) 166 NM

c) 144 NM

d) 170 NM

5. A fix indicates you are120NM from a ground feature that is in line with the wing tip. After 2 minutes the same feature is 2◦ behind the wing tip. What is your Ground Speed? (Use 1:6 rule)

a) 100 kt

b) 110 kt

c) 130 kt

d) 120 kt

6. Kerry (5210.9N 00932.0W) is 41 NM DME. Galway (5318.1N 00856.5W) is 50 NM DME. What is your position? (Use chart E(LO)1)

a) 5242N 00827W

b) 5255N 00819W

c) 5219N 00809W

d) 5230N 00834W

7. What is the mean true track and distance from the BAL VOR (5318N 00627W) to CRN VOR/DME (5318N 00856W)? (Use chart E(LO)1)

a) 272 89

b) 272 88

c) 270 89

d) 270 88

8. You are on the 239 radial 36 NM from SHA VOR (5243N 00853W). What is your position? (Use chart E(LO)1)

a) 5212N 00915W

b) 5212N 00930W

c) 5215N 00930W

d) 5220N 00939W

9. What is the radial and DME distance from SHA VOR (5243N 00853W) to Birr Airport (5304N 00754W)? (Use chart E(LO)1)

a) 068M 40NM

b) 068M 42NM

c) 060M 40NM

d) 060M 42NM

10. What is the average track (◦T) and distance between WTD NDB (N5211.3 W00705.0) and FOY NDB (N5234.0 W00911.7)? Refer to E(LO)1

a) 277◦ – 83 NM

b) 286◦ – 81 NM

c) 294◦ – 80 NM

d) 075◦ – 81 NM

RELATIVE VELOCITY

1. Aircraft A is at FL350, TAS 440 kt with an equivalent wind component (EWC) of -50 kt and estimating TLA NDB at 0815. Aircraft B is on the same track at FL310, TAS 480 kt with a wind component of -30 kt and estimating TLA at 0820. The time at which aircraft B will overtake A is:

a) 0848

b) 0844

c) 0852

d) 0856

2. Aircraft A is at FL350, M0.82, OAT -55◦C with an EWC of +25 kt and estimating POL NDB at 1020. Aircraft B is on the same track at FL310, M0.82, OAT -46◦C with a wind component of +40 kt and estimating POL at 1022. The two aircraft will pass at:

a) 244 NM from POL

b) 232 NM from POL

c) 343 NM from POL

d) 299 NM from POL

3. Aircraft A passes over VOR ‘A’ at 1110 enroute to VOR ‘B’ 1232 NM away at a Groundspeed of 490 kt. Aircraft B reports VOR ‘B’ at 1123 on a reciprocal track with a Ground speed of 380 kt. The aircraft will pass at:

a) 1243

b) 1246

c) 1237

d) 1241

4. The distance from ‘A’ the aircraft in Question 140 will pass is:

a) 637 NM

b) 743 NM

c) 595 NM

d) 768 NM

5. An aircraft is cruising at M0.84, FL330, OAT -43◦C with a wind component of -30 kt and reports waypoint ‘G’ at 2230. ATC instructs the pilot to reduce speed to M0.76 at his discretion to be at waypoint ‘H’, 350 NM away, not before 2320. The latest time at which the speed reduction can be made is:

a) 2230

b) 2237

c) 2233

d) 2241

6. Aircraft J is overhead YQT NDB at 0800 with a groundspeed of 300 kt. Aircraft K is following on the same track with a groundspeed of 360 kt and is overhead YQT at 0825. The time at which the aircraft will be 100 NM apart is:

a) 0832

b) 0825

c) 0850

d) 0856

7. The aircraft in Question 143 are routing to VBI VOR 196 NM from YQT. The minimum groundspeed reduction that aircraft K must make at YQT to be 120 NM behind J when J passes VBI is:

a) 115 kt

b) 21 kt

c) 63 kt

d) 39 kt

8. Use the following information to answer Questions 145, 146, 147: Aircraft A is overhead waypoint 1 at 2330 enroute to waypoint 2, 750 NM away at a groundspeed of 490 kt. Aircraft B checks waypoint 1 on the same track but 4000 ft lower at 2335 with a groundspeed of 535 kt. If no speed changes are made the distance from waypoint 1 that the aircraft will pass is:

a) 487 NM

b) 505 NM

c) 525 NM

d) 543 NM

9. Aircraft B is instructed to reduce speed to 490 kt to cross waypoint 2, 2 minutes after aircraft A. The latest time for speed reduction is:

a) 0003

b) 0008

c) 0013

d) 0018

10. At the point of speed reduction the separation of the two aircraft is:

a) 20 NM

b) 14 NM

c) 18 NM

d) 16 NM

11. Aircraft A, FL330, TAS 400 kt, EWC -30 kt, estimates point X at 1620. Aircraft B, FL 370, TAS 515 kt, EWC -40 kt, estimates point X at 1625. Both aircraft are on the same track. The time aircraft B will pass aircraft A is:

a) 1637½

b) 1642½

c) 1647

d) 1629

12. An aircraft with a GS of 300 kt is overhead J at 1100. This aircraft is followed by another at the same FL, GS 360 kt, which arrives overhead J at 1125. Both aircraft are following the same route to K, 220 NM from J. The first time the aircraft will be 120 NM apart is:

a) 1130

b) 1125

c) 1144

d) 1151

13. Aircraft X, GS 315 kt is over point C at 1200 on the direct track to D. At 1224 aircraft Y, flying the same route at the same FL, but with GS 405 kt, passes over point C. At what time will the separation between the aircraft be 90 NM?

a) 1225

b) 1248

c) 1245½

d) 1224

14. An aircraft with a GS of 285 kt is overhead P at 0630. Another aircraft follows this aircraft, GS 318 kt, and reports overhead P 15 minutes later. Both aircraft are following the same track. Using the above information, answer

the following question and Question 152. The time at which the distance between the aircraft has reduced to 40 NM is:

a) 0727

b) 0742

c) 0651

d) 0636

15. How far from P will the slower aircraft be at this time?

a) 270½ NM

b) 342 NM

c) 160 NM

d) 28 NM

16. On a flight from A to B, distance 720 NM, an aircraft whose GS is 360 kt is instructed to delay arrival by nine minutes. It is decided that this will be accomplished by reducing the GS by 60 kt. The minimum distance from B that this reduction can be carried out is:

a) 54 NM

b) 45 NM

c) 270 NM

d) 324 NM

17. On a flight from E to F, distance 720 NM, an aircraft, GS 250 kt is instructed to delay arrival by six minutes. This is to be accomplished by reducing the GS to 200 kt. The minimum distance from F that this reduction can be carried out is:

a) 130 NM

b) 25 NM

c) 100 NM

d) 125 NM

18. Aircraft A, TAS 402 kt, EWC -30 kt, estimates point Q at 2348. Aircraft B, TAS 455 kt, EWC -40 kt, estimates point Q at 2333. Both aircraft are on the same track. Using the above formation, answer the following question and Question 156. What is the latest time aircraft A must reduce TAS to 366 kt so as to arrive overhead Q, 20 minutes after aircraft B?

a) 2241½

b) 2301½

c) 2313

d) 2257

19. How far from Q is aircraft B at the time calculated above:

a) 248 NM

b) 138 NM

c) 1,473 NM

d) 218 NM

20. An aircraft TAS 500 kt, HWC 78 kt, is requested not to cross position X, 630 NM away, before 1754. The request is made at 1612. What is the latest time at which the aircraft TAS can be reduced to 400 kt, in order to cross position X at 1754:

a) 1703

b) 1624

c) 1701

d) 1654

POINT OF SAFE RETURN AND POINT OF EQUAL TIME

1. Calculate the distance to the PSR from origin, point A, given:

Safe endurance	2.5 hours
TAS	200 kt
W/V	200◦/25 kt
Track A – B	047◦

a) 200 NM

b) 212 NM

c) 224 NM

d) 246 NM

2. Calculate the distance to the PSR from origin, point A, given:

Safe endurance	3 hours 54 minutes
Ground speed out	180 kt
Ground speed home	200 kt

a) 370 km

b) 390 NM

c) 370 NM

d) 390 km

3. Calculate the time to the PSR, given:

Safe endurance 3 hours

Ground speed out 170 kt

Ground speed home 185 kt

a) 1 hour 36 min

b) 1 hour 34 min

c) 1 hour 32 min

d) 1 hour

4. Calculate the distance to PSR, given:

Safe endurance 11 hours

Ground speed out 478 kt

Ground speed home 575 kt

a) 3871 NM

b) 2781 NM

c) 2500 NM

d) 2871 NM

5. Calculate the time and distance to the PSR given a turbojet aircraft requiring statutory reserve of 30 minutes given:

COAT -47◦C

Mach 0.78

W/C Out + 140 kt

Trip distance 5100 NM

Total endurance 11 hours 30 minutes

a) 2625 NM 8 hours

b) 2225 NM 2 hours

c) 2265 NM 8 hours

d) 2100 NM 2 hours

6. How does the wind component affect the PSR? An increase or decrease in wind component will ———- the distance to the PSR?

a) Increase

b) Decrease

c) Not change

d) Increase or decrease

7. Calculate the distance to PSR, given:

TAS 450 kt

EWC Out -100 kt

Safe endurance 6 hours

a) 1283 NM

b) 1085 NM

c) 1283 NM

d) 1085 NM

8. Calculate the time to the PSR, given:

Safe endurance 6 hours 30 minutes

Ground speed out 225 kt

Ground speed home 145 kt

a) 2.54 hours

b) 2 hours 54 min

c) 30 hours

d) 2 hours 10 minutes

9. Calculate the distance to the PSR, given:

Safe endurance 10 hours

TAS 454 kt

W/V at 25 000ft 270◦/100 kt

Heading Out 090◦

Flight Level	250

a) 2100 NM

b) 2160 NM

c) 2200 NM

d) 2222 NM

10. What is the distance to PSR, given:

Safe endurance	4 hours
Ground speed out	140 kt
Ground speed home	90 kt

a) 193 NM

b) 219 NM

c) 229 NM

d) 232 NM

11. An aircraft departs point A to route via points B and C to get to D. Given the data

below, where does the PSR lie in relation to A?

Sector	Distance	TAS	W/C
A-B	1000 NM	500 kt	+50
B-C	1500 NM	500 kt	-200

C-D	50 NM	500 kt	Zero

Total (ATC) Endurance 8 hours

Required Reserves 30 minutes

a) 1635 NM

b) 1729 NM

c) 1808 NM

d) 1812 NM

12. As far as the critical point is concerned, the PET always moves ———– wind.

a) Into

b) Out of

c) Because of

d) Around

13. An aircraft is in the cruise having departed point A at 1200 hours UTC. Aircraft systems are functioning properly. A passenger, however, has suffered from a major heart attack, and has not responded well to onboard treatment. The pilot has the option to use an (on-track) en-route alternate, and must decide whether to return to base or continue to the alternate. The pilot must therefore decide where he is in relation to PET for this type of emergency, in order to expedite a landing as soon as possible. Fuel is sufficient for any reasonable course of action.

At what time will he calculate the PET should be / should have been reached?

Cruise speed (TAS) outbound 400 kt

Highest available safe cruise speed 430 kt

Distance from base to en-route alternate 2000 NM

Equivalent Wind Speed (out / in) +90 kt

(home) -90 kt

a) 1259 UTC

b) 1435 UTC

c) 1400 UTC

d) 1337 UTC

14. Given the following information, calculate the time taken to reach the PET:

A to B is 500 NM

TAS is 300 kt

EWC out / on -25 kt, back +30 kt

a) 30 minutes

b) 45 minutes

c) 59 minutes

d) 61 minutes

MAGNETISM AND COMPASSES

1. Deviation due to vertical soft iron varies:

a) Directly with the tangent of the dip angle

b) Directly with H, the horizontal component of the Earth's magnetic field

c) Directly with Z, the vertical component of the Earth's magnetic field

d) Inversely with the tangent of the dip angle

2. Coefficient B is the sum of:

a) P and cZ

b) P and fZ

c) Q and cZ

d) Q and fZ

3. Coefficient C is the sum of:

a) P and fZ

b) P and cZ

c) Q and cZ

d) Q and fZ

4. A change in the deviation of the magnetic compass will occur with an increase of magnetic latitude because:

a) Residual dip increase with an increase in latitude

b) The Z component of the Earth's magnetic field increase with an increase in latitude

c) Horizontal hard iron increases with an increase in latitude

d) Horizontal hard iron decreases with an increase in latitude

5. When carrying out a compass swing, you must align:

a) True North and magnetic North

b) Magnetic North and compass North

c) True North and compass North

d) Compass lubber line and compass North

6. In a turn from 045◦ to 315◦ through North, in the Southern hemisphere, the movement of the magnet system of a direct reading compass when viewed from above, and the effect of liquid swirl caused by the movement, are:

Magnet System Liquid Swirl

1. **a) Clockwise Reduce**
2. b) Anti-clockwise Reduce
3. c) Clockwise Increase
4. d) Anti-clockwise Increase

5. During deceleration after a landing on a northerly runway in the Northern Hemisphere, the magnetic compass will indicate:

a) An apparent turn to the North

b) No apparent turn

c) An apparent turn to the South

d) A heading fluctuation about 360◦

8. What are the primary methods of achieving Horizontality, Sensitivity, and Aperiodicity in a Direct Reading Compass?

Horizontality	Sensitivity	Aperiodicity
a) Low CG	**Jeweled pivot**	**Wires in the fluid**
b) Low CG	Large magnets	Immerse in fluid
c) Strong magnets	Immerse in fluid	Damping filaments
d) High CG	Jeweled pivot	Damping filaments

9. If a turn is made from 130◦ to 230◦ with reference to a DGI, what will the DRC read on initial roll out?

a) 230◦ in the Northern hemisphere

b) 210◦ in the Southern hemisphere

c) 210◦ in the Northern hemisphere

d) 250◦ in the Southern hemisphere

PRESSURE INSTRUMENTS AND RADIO ALTIMETERS

1. With reference to an altimeter, what will be the effect if the static source becomes blocked during the climb:

a) It will indicate a large increase

b) It will progressively under read

c) It will indicate zero

d) It will progressively over read

2. If a servo altimeter has a quoted accuracy of 1 hPa, what is the accuracy at FL 300 and FL390:

a) 70 ft and 105 ft

b) 70 ft and 83 ft

c) 47 ft and 83 ft

d) 47 ft and 105 ft

3. When flying an aircraft from an area of warm air to an area of cold air, the altimeter will:

a) Under reads

b) Stays the same

c) Over reads

d) The instrument will act as a VSI

4. A vibrator may be fitted to an altimeter to overcome:

a) Aperiodicity

b) Frictional lag

c) Hysteresis

d) Horizontality

5. Lag in an IVSI is virtually eliminated by means of:

a) An accelerometer system

b) A vibrator

c) A bimetallic strip

d) A ceramic choke unit

6. A blockage occurs in the ram air source and drain hole, with the static source open. The airspeed indicator in a non-pressurised aircraft will:

a) Read a little high

b) Act like an altimeter

c) Read a little low

d) Freeze at zero

7. An airspeed indicator has a leak in the circuit supplying pitot air, what will be seen on the indicator:

a) Act as an altimeter

b) Over read

c) Under read

d) Remain affected

8. An ASI circuit consist of pressure sensors, the Pitot Probe measures:

a) Dynamic pressure

b) Total pressure

c) Total pressure and Static pressure

d) Static pressure

9. The CAS is obtained by applying to the IAS:

a) An instrument and position/pressure error correction

b) An instrument and density correction

c) A compressibility correction

d) A compressibility and density correction

10.The white arc on an ASI indicates:

a) Vso at the lower end and Vfe at the upper end

b) Vsi at the lower end and Vfe at the upper end

c) Vso at the lower end and Vno at the upper end

d) Vsi at the lower end and Vne at the upper end

11.Mach number is defined as the ratio of:

a) TAS to LSS

b) IAS to LSS

c) CAS to LSS

d) EAS to LSS

12.Which of the following instruments have a feed of pitot pressure:

I Altimeter

II ASI

III VSI

IV Mach meter

V ADC

a) All

b) II, III, IV and V

c) II, IV and V

d) II and IV

13. If the static vent becomes blocked during a descent:

I Altimeter will under read/Mach meter will under read

II VSI will indicate a climb/ASI will over read

III Mach meter will over read/VSI reduces to zero

IV ASI over reads/Altimeter over reads

V VSI indicates descent/Altimeter does not change

a) III and IV

b) I and V

c) III and V

d) II and I

14. A conventional Mach meter consists of:

a) An ASI with an altitude capsule

b) An ASI with a mach scale

c) An altimeter corrected for density

d) A VSI and altimeter combined

15. What does a Mach meter measure?

T = Total pressure, S = Static pressure, D = Dynamic pressure

a) T – S/S

b) D – S/S

c) D + S/T

d) D/T – S

16. What are the inputs of the Air Data Computer:

I TAT

II SAT

III Angle of attack

IV Static pressure

V Dynamic pressure

VI Pitot pressure

VII Electric power

a) I, III, IV, VI and VII

b) I, II, III, V and VII

c) I, III, V and VI

d) II, IV and V

17. A modern radio altimeter uses the frequency band:

a) HF

b) VHF

c) SHF

d) UHF

18. Which is the operation frequency for a radio altimeter?

a) 430,000MHz

b) 4,300 MHz

c) 430 MHz

d) 4.3 MHz

19. A radio altimeter is:

a) Ground based and measures true height

b) Aircraft based and measures true altitude

c) Aircraft based and measures true height

d) Ground based and measures true altitude

20. The radio altimeter is used for accurate height indication on modern transport aircraft between:

a) 50 ft and 2450 ft

b) 0 ft and 5000 ft

c) 50 ft and 5000 ft

d) 0 ft and 2500 ft

GYROS

1. An air driven DGI will have:

a) One degree of freedom and a horizontal axis

b) Two degrees of freedom and a vertical axis

c) One degree of freedom and a vertical axis

d) Two degrees of freedom and a horizontal axis

2. The properties of a gyroscopic flight instrument are:

I Rigidity

II Precession

III Inertia

IV Instability

a) I, II, III and IV

b) I and II

c) II and IV

d) I, II and III

3. The sources of error in a DGI are:

I Earth rate

II Transport wander

III Manufacture

IV Gimbal lock

V Rigidity

VI Precession

a) I, II, and III

b) I, II, III, IV, V, VI

c) I, II, III and IV

d) II, III, IV, V and VI

4. What will the drift rate of a frictionless gyro at a mean latitude of 30◦N traveling from 30◦W to 36◦W in two hours if the latitude nut is set for 50◦N?

a) +2.5◦/hour

b) +5.5◦/hour

c) -5.5◦/hour

d) +11.0◦/hour

5. A Gyro used in a Rate of turn and bank indicator will have:

a) Two degrees of freedom and a horizontal spin axis

b) One degree of freedom and a horizontal spin axis

c) Two degrees of freedom and a vertical spin axis

d) One degree of freedom and a vertical

6. The needle and ball of a TBI are both displaced to the right, what condition is shown:

a) A left turn with too much bank

b) A right turn with too little bank

c) A right turn with too much bank

d) A left turn with too little bank

7. What angle of bank is required for a Rate 1 turn for an aircraft traveling at 180 kt?

a) 10◦

b) 18◦

c) 25◦

d) 30◦

8. A Gyro used in an instrument which, provides roll and pitch information, has:

a) One degree of freedom and a horizontal spin axis

b) Two degrees of freedom and a horizontal spin axis

c) Two degrees of freedom and a vertical spin axis

d) One degree of freedom and a vertical spin axis

9. If an Aircraft carries out a 270◦ turn to the left, what will a classic AH indicate?

a) Nose up, bank left

b) Nose down, bank left

c) Nose up, bank right

d) Nose down, bank right

10. A gravity erector system is used to correct the errors on:

a) An artificial horizon

b) A directional compass

c) A gyromagnetic compass

d) A turn indicator

BASIC RADIO PRINCIPLES

1. The distance traveled by a radio wave in the direction of propagation during one cycle is:

a) Frequency

b) Polarisation

c) Cyclic range

d) Wavelength

2. The speed of radio waves in free space is:

a) 30 million m/s

b) 161 800 m/s

c) 300 million m/s

d) 1860 NM/s

3. The frequency corresponding to a wavelength of 1.4 km is:

a) 214 MHz

b) 214 kHz

c) 116 Hz

d) 4.7 kHz

4. A wavelength of 3 cm is equivalent to a frequency of:

a) 3 GHz

b) 300 GHz

c) 100 MHz

d) 10 GHz

5. A radio aid operating on a frequency of 114.95 MHz would be in the:

a) VHF band

b) UHF band

c) MF band

d) SHF band

6. Radio work is confined to a spectrum of frequencies between 3 kHz and 300 GHz mainly because:

a) Very high power inputs are necessary at extremely long wavelengths

b) Large aerials are required at extremely high frequencies, coupled with problems of static and attenuation of very long wavelengths

c) Atmospheric static affects very low frequencies also radio waves of extremely short wavelengths are severely attenuated

d) Both a) and c)

7. Attenuation of radio waves is usually caused by:

a) Absorption

b) Scattering

c) Geometrical dispersion

d) Any or all of these

8. The process by which the amplitude of a radio carrier wave is varied in sympathy with the amplitude & frequency of as audio wave is known as:

a) Frequency modulation

b) Pulse modulation

c) Phase modulation

d) Amplitude modulation

9. The bandwidth of a transmission is:

a) Twice the maximum frequency of the modulating audio wave

b) The width of one sideband

c) The difference between carrier and audio frequencies

d) Half the modulating frequency

10. The emission code for a VOR is:

a) A9W

b) F

c) A1A

d) A8W

11. The range at which ground waves can be received depends upon:

a) The frequency & power of transmission

b) Height of aerials and interference

c) Nature of terrain

d) All of the above

12. The principal source of attenuation in the ionosphere and of the refraction of VLF waves during daylight is:

a) The 'D' layer

b) The 'E' layer

c) The 'F' layer

d) All of these

13. Regarding HF communications, frequencies used by night are usually:

a) The same as daytime frequencies

b) Lower than daytime frequencies

c) Higher than daytime frequencies

d) Higher or lower depending on the strength of the ionosphere

14. Which of the following is attributed to VHF/UHF propagation?

a) Direct waves super-refraction

b) Direct waves ionosphere ducting

c) Ground waves ionosphere ducting

d) Sky waves ‘D’ layer attenuation

15. If the power of a transmitter is quadrupled, the range effectively would:

a) Increase 1.4 times

b) Double

c) Quadruple

d) Remain the same

16. What is the wavelength of a VOR?

a) Metric

b) Decimetric

c) Heximetric

d) Centimetric

17. If the strength of a radio signal decreases away from the transmitter, this effect is called:

a) Attenuation

b) Ducting

c) Refraction

d) Fading

18. What wavelength are used for NDB?

a) Hectometric

b) Metric

c) Centimetric

d) Decimetric

VHF DIRECTION FINDING

1. VDF for aeronautical use provides service in the frequency band:

a) 108 – 136 MHz

b) 118 – 137 MHz

c) 130 – 300 MHz

d) 108 – 118 MHz

2. The indicator of the ground VDF equipment responds to:

a) The carrier wave received

b) The identification transmitted from the aircraft

c) The voice modulated signal transmitted by the aircraft

d) The signal being reflected from the aircraft

3. If, when you are requesting a QDM from an airfield, you are offered a QGH, it means?

a) The VDF unit is prepared to give you assistance during an approach to the airfield, based on VDF bearings

b) The VDF service will be handled by a different VDF unit, operating on the same frequency

c) The bearing will only be accurate when the aircraft is flying above the QGH level

d) The service will be limited to bearings, no positions will be given by the DF station

4. A ground DF (VDF) station will normally provide the following bearings to an aircraft in flight:

a) QTE/QDM

b) QUJ/QNH

c) QNE/QNH

d) QDR/QFE

NDB AND ADF

1. The basic information given by the ADF is:

a) The magnetic bearing from the aircraft to the NDB

b) The relative bearing from the aircraft to the NDB

c) The true great circle track from the NDB to the aircraft

d) The magnetic direction of the loop aerial with reference to the sense aerial

2. Which of the following statements regarding an aeronautical NDB is correct?

a) It operates in the MF/HF band

b) To overcome the limitations caused by 'line of sight' propagation, high power transmitters must be used

c) It is very simple, transmitter being required to transmit only a carrier wave and identification

d) In Europe, most NDB's operate in the frequency band 455 – 1750 kHz

3. Which of the following is the ICAO allocated frequency band for ADF receivers?

a) 108.0 MHz – 117.9 MHz

b) 200 – 1750 MHz

c) 200 – 1750 Hz

d) 190 – 1750 kHz

4. Homing on an NDB:

a) Calls for an assessment of the drift

b) Is most effective in strong winds

c) Will in most situations result in frequent heading changes when approaching the NDB

d) Will result in passing the NDB along the planned track

5. Flying in the vicinity of CB clouds and using ADF:

a) The ANT position of the function switch can be used to listen for NDB ID

b) Strong static emitted from the CB may cause the ADF needle to deflect towards the CB

c) The static emitted from the CB during daytime will fade soon after you have passed it

d) All 3 answers are correct

6. An aircraft is flying on heading 330◦ and relative bearing to an NDB is 190◦. Calculate QDR:

a) 360◦

b) 160◦

c) 340◦

d) 140◦

7. An aircraft is flying on heading 300◦, variation in the area 13◦W and the realative bearing is 350◦. Calculate QDM:

a) 110◦

b) 290◦

c) 300◦

d) 150◦

8. The bearings from NDB’s are least accurate at:

a) Midnight

b) Midday

c) Dawn and Dusk

d) The accuracy does not change during night or day

9. Fading of an ADF signal, together with a hunting needle, is indication of:

a) Quadrantal effect

b) Thunderstorm effect

c) Night effect

d) Mountain effect

VOR AND DOPPLER VOR

1. The antenna polar diagram of a conventional VOR:

a) Is always directed toward the aircraft

b) Is like a figure of 8

c) Is a pencil beam

d) Rotates at 30 revolutions per second

2. The TO/FROM indicator of a VOR:

a) Tells whether you are now flying towards or from the VOR

b) Tells whether a track equal to the selected bearing will bring you to or away from the VOR

c) Tells whether the deviation indicator shows that you should manoeuvre the aircraft towards or from the CDI needle

d) Tells whether you should turn the aircraft towards or away from the CDI indication

3. In order to establish what radial you are on, you could:

a) Read the OBS when the CDI is centred and the TO/FROM is showing TO

b) Rotate the OBS until the CDI is centred and the TO/FROM indicator is showing FROM. Then read the radial on the OBS

c) Turn the OBS to make the TO/FROM change from TO to FROM. The OBS is now indicating the radial you are on

d) Turn the aircraft until the CDI is centred. The aircraft magnetic heading is now the reciprocal of the radial you are on

4. The height of a VOR above MSL is HT(VOR) feet, and the aircraft is flying at true altitude HT(a/c) feet. Which equation will show maximum range in NM of reception of this VOR?

a) Max. range = 1.25 times square root of HT(a/c) + 1.25 times square root of HT(VOR)

b) Max. range = 1.25 times square root of HT(a/c) + 1.25 times of HT(VOR)

c) Max. range = 1.25 times square root of HT(a/c) – 1.25 times square root of HT(VOR)

d) Max. range = 1.25 times square root of HT(a/c) – 1.25 times of HT(VOR)

5. What degrades the accuracy of a VOR?

a) Static interference

b) Propagation errors due to uneven terrain

c) Night effect

d) Coastal effect

6. In a conventional VOR (CVOR), which element of the transmission uses amplitude modulation and which uses frequency modulation?

a) The variable-phase and bearing use AM. The ATIS information is FM

b) The variable-phase is AM. The reference is FM

c) The reference and ATIS is AM. The variable-phase is FM

d) The reference is AM. The variable-phase is FM

7. An aircraft is required to approach a VOR station via the radial 340. Which of the following indications should be seen on the VOR/ILS deviation indicator, and what is the position of the TO/FROM indicator?

a) 340◦ with the TO flag showing

b) 340◦ with the FROM flag showing

c) 160◦ with the TO flag showing

d) 160◦ with the FROM flag showing

8. If using VOR bearing information beyond the published protection range, errors could be caused by:

a) Interference from thunderstorms

b) Coastal refraction

c) Night effect

d) Interference from other transmitters

DISTANCE MEASURING EQUIPMENT

1. In the DME system:

a) The aircraft equipment is called a transponder

b) The receive and transmit frequency is always split by 63 MHz

c) The operation is similar to a primary radar system

d) The channels are referred to as “X” channels paired with VOR’s and “Y” channels paired with ILS localisers

2. The airborne DME equipment will transmit pulse pairs at a comparatively high PRF:

a) At all times, except when the panel control “LO” is operated

b) When the distance presented is above 50 NM

c) Whenever a stable signal is being received from the selected ground station

d) When first switched on and after a channel selection

3. System, or beacon, saturation of the DME system:

a) Occurs when the aircraft DME set has been in operation for an extended period of time, without being put into the STAND/BY mode

b) Occurs when many aircraft, being at along distance from the DME, are demanding a reply

c) May occur when more than 100 aircraft are demanding replies from a single ground station

d) All 3 answers are correct

4. If a VOR station and a DME station, having different locations, are selected to provide a fix:

a) Two sets, with separate frequency control, are required in the aircraft

b) Two positions, being ambiguous, will be presented

c) Two different IDs will have to be checked

d) All 3 answers are correct

5. Using modern DME equipment meant for general navigation use, the accuracy expected is:

a) ±2 NM

b) ±5 NM or 0.25% of the slant range, whichever is greater

c) ±2 NM + 0.25% of the slant range, whichever is greater

d) ±2 NM + 3.0% of the slant range

6. How many aircraft will saturate a DME station?

a) 200 aircraft

b) 100 aircraft

c) 50 aircraft

d) 2700 aircraft

7. A DME transceiver does not lock on to its own reflections because:

a) The PRF of the pulse pairs is jittered

b) It used MTI

c) The interrogation and reply frequencies differ

d) The reflections will all fall within the flyback period

8. An aircraft is passing overhead a DME station at FL 240. What is the DME indication?

a) 0 DME

b) 1 DME

c) 4 DME

d) 6 DME

INSTRUMENT LANDING SYSTEM

1. Consider the following statements on ILS:

a) An ILS approach may be flown if the localizer, glide path and marker beacons/DME are operational

b) If the localizer is out of service, an ILS approach with increased decision height (DH) may be carried out

c) ILS is the primary precision approach facility for civil aviation

d) When the pilot is reaching the decision height (DH) he may only continue the approach if both localizer and glide path indications are within one dot from the centre positions

2. Which of the following frequencies does ILS use?

a) 112.10 MHz

b) 111.20 MHz

c) 108.45 MHz

d) 109.35 MHz

3. The ILS glidepath transmitter is located:

a) No more than 600 m from the localizer transmitter

b) About 150 m upwind from the threshold and about 300 m from the centre line of the runway

c) About 300 m upwind from the threshold and about 150 m from the centre line of the runway

d) As close to the runway threshold as possible without causing an obstruction to aircraft

4. The glidepath transmitter operates on:

a) 36 VHF frequencies, paired with localizer frequencies

b) The frequencies 90 and 150 MHz

c) On frequencies found by multiplying the localizer frequency by 2

d) 40 frequencies from 329.15 MHz to 335.00 MHz

5. If the ILS monitoring equipment senses a shift or changes outside set limits in the basic transmission:

a) The Tower Control will inform any inbound aircraft about the inaccuracy

b) The technicians on duty will switch on the stand/by ILS equipment

c) The pilot on ILS approach will be notified by the identification signal disappearing

d) The transmissions on a Cat I ILS will be stopped within 6 seconds

6. The middle marker is identified by:

a) Audible alternate dots and dashes with tone 1300 Hz and an amber light

b) Audible alternate dots and dashes with tone 800 Hz and an amber light

c) Audible alternate dots and dashes with tone 800 Hz and a white light

d) Audible alternate dots and dashes with tone 1300 Hz and a white light

7. What is the width of the localizer from full fly left through centre to full fly right on the cockpit localizer indicator?

a) 10◦

b) 20◦

c) 5◦

d) 2.5◦

8. When flying outside the ILS published coverage area, you may expect:

a) Incorrect/false signals

b) Correct signals

c) Always fly up signal

d) Always fly down signal

MICROWAVE LANDING SYSTEM AND RADAR PRINCIPLES

1. In a primary radar system:

a) The aircraft plays the secondary role, just listening to the radar signals from the ground radar

b) All radio frequency energy is produced by the radar located at the radar site

c) The radar is primarily used for range finding

d) The radar is the primary aid for ATC

2. What governs the theoretical maximum range of primary radar?

a) Frequency

b) Wavelength

c) Pulse repetition frequency

d) Pulse width

3. Primary radar operates on the principle of:

a) Medium wave technique

b) Pulse technique

c) Doppler technique

d) None of the above

4. When dealing with radar the term PRF is used, PRF is measured in which unit?

1. a) Number of pulses per minute
2. b) Number of oscillations per second
3. **c) Number of pulses per second**
4. d) Number of oscillations per minute

5. Consider the following statements on primary radar:

a) Precipitation will reduce the range of radars operating on low frequencies to larger extent than radars operating on higher frequencies

b) Target shape and size has little influence on the radar maximum range

c) Temperature inversions may increase the maximum detection range

d) The most common radar indicator is called an “A” scope

6. In order to achieve narrow beam width with a radar antenna of a set size:

a) The carrier frequency must be low

b) The PRF must be high

c) The pulse length must be kept short

d) The wave-length must be short

7. In a radar set the purpose of the TR switch is:

a) To change the whole set from receive mode to transmit mode

b) To protect the receiver while the pulse is transmitted

c) To set the time reference of the indicator

d) To secure that the Time of Return is registered

8. A radar system has a PRF that is 1200. Calculate the maximum unambiguous range:

a) 125 NM

b) 135 NM

c) 68 NM

d) 250 NM

9. Long range surveillance radar may typically use a frequency of :

a) 1000 MHz

b) 600 MHz

c) 3000 MHz

d) 10 GHz

10. Why does the aircraft transponder system not respond to its own transmissions when reflected from the ground?

a) Different frequencies are used 60 MHz apart

b) Pulse repetition frequency changed

c) The transponder system does not reply to its own reflected signals, but these responses are rejected by the transponder system at the site

d) The aircraft signal is not reflected

11. Which combination of characteristics gives the best resolution in a primary search radar?

a) Long pulse length and wide beam

b) Short pulse and wide beam

c) Long pulse and narrow beam

d) Short pulse length and narrow beam

12. The purpose of a radio transmitter is:

a) To produce a carrier wave with a constantly changing frequency

b) To produce a radio frequency electric current and deliver this energy to the antenna

c) To produce a carrier wave to the audio frequency output of the transmitter

d) All three answers are correct

GLOBAL NAVIGATION SATELLITE SYSTEMS

1. The most favoured type of GPS receiver for use in civil transport aircraft is:

a) The Five Satellite Receiver

b) The Multi Channel

c) The Multi Satellite Receiver

d) The Universal Receiver

2. One task of the control segment of the satellite navigation system NAVSTAR/GPS is to:

a) Monitor the status of the satellites

b) Manufacture and launch satellites

c) Manipulate the signals of the selected satellites to reduce the precision of the position fix (Selective availability SA)

d) Grant and monitor user authorisations

3. The clock in the GPS receiver is corrected to the GPS time system:

a) By synchronizing it with the time signal sent by the Master satellite

b) By mathematically adjusting the lines of position from four satellites to a perfect fix

c) Using the average of the time signal received from at least 3 satellites

d) Automatically as soon as signals from 1 satellite is received

4. The GPS satellites will complete an orbit in approximately:

a) 6 hours

b) 12 hours

c) 24 hours

d) 21 hours

5. GPS system satellites transmit their signals on two carrier waves 1575 MHz and 1227 MHz and supply two possible codes accessible according to user (civil or military). Commercial aviation uses:

a) Only the 1575 MHz carrier wave and two codes

b) Only the 1227 MHz carrier wave and one code

c) The two carrier waves and one public code

d) Only the 1575 MHz carrier wave and one code

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

a) Is negligible small because of the great accuracy of the atomic clocks in the satellites

b) Is the biggest part of the total error and cannot be corrected

c) Can be minimized by synchronizing the satellite clock with the receiver clock

d) Is corrected by using signals from four satellites

7. Differential GPS is a system that allows the GPS receiver to correct known errors in the position calculations. Which errors are corrected?

a) Receiver clock error and receiver noise

b) Receiver noise

c) Receiver clock error, ephemeris satellite clock and ionosphere delay

d) Ephemeris

AIRBORNE WEATHER RADAR

1. How many degrees will an AWR be pitched to establish whether a cloud is level with the aircraft, assuming a 5◦ beamwidth?

a) + 2.5◦

b) – 2.5◦

c) 0◦

d) 5◦

2. What are the advantages of using a slotted waveguide antenna in AWR?

a) More side lobes and concentrates the power in sharper beams

b) Less side lobes but the beams tend to be wider

c) More side lobes but the power is concentrated in sharper beams

d) Less side lobes and concentrates power in sharper beams

3. In AWR that has a colour cathode ray tube, the areas of greatest turbulence are indicated on the screen by:

a) Iso-echo areas which are coloured black

b) Iso-echo areas which are coloured magenta

c) Blank Iso-echo areas where there is no colour

d) Large flashes of flashing red colour

4. The purpose of the contour circuit on a monochrome airborne weather radar is to:

a) Indicate severe areas of CAT

b) Show areas with heavy precipitation as dark areas on the display surrounded by bright returns

c) Disable the receiver swept gain function in order to achieve maximum amplification

d) Enable the radar to be used for terrain clearance

5. A frequency of AWR is:

a) 9375 MHz

b) 9375 kHz

c) 9375 GHz

d) 93.75 MHz

6. The main task of an AWR is:

a) To detect areas of potentially severe turbulence ahead of the aircraft

b) To detect and present a radar picture of clouds with precipitation ahead of the aircraft

c) To detect areas with strong winds ahead of the aircraft

d) To detect and relay to meteorological offices information on the weather in the area ahead of the aircraft

Arunaksha Nandy

NAVIGATION QUESTIONS

1. **Pressure Altitude is 27,000 feet, OAT = -35°C, Mach No = 0.45, W/V = 270/85, Track == 200°T. What is drift and groundspeed?**

   a 18L / 252 knots **b 15R / 310 knots**

   c 17L / 228 knots **d 17R / 287 knots**

2 G/S = 240 knots, Distance to go = 500 nm. What is time to go?

a 20 minutes **b 29 minutes** **c 2 h 05 m** **d 2 h 12 m**

3 OAT = +35°C, Pressure alt = 5000 feet. What is true alt?

a 4550 feet **b 5550 feet** **c 4290 feet** **d 5320 feet**

4 Course 040°T, TAS 120 knots, Wind speed = 30 knots. From which direction will the wind give the greatest drift?

a 215°T b 230°T c 235°T d 240°T

5 Required course 045°T, W/V = 190/30, FL = 55 @ ISA, Variation = 15°E. CAS = 120 knots. What is mag heading and G/S?

a 052°M 154 b 067°M 154

c 037°M 154 d 037°M 113

6 An aircraft flies a great circle track from 56°N 070°W to 62°N 110°E.

The total distance travelled is?

a 3720 NM b 5420 NM c 1788 NM d 2040 NM

7 You are flying 090°C heading. Deviation is 2W and Variation is 12 E. Your TAS is 160 knots. You are flying the 070 radial outbound from a VOR and you have gone 14 nm in 6 minutes. What is the W/V?

a 158°T /51 b 060°T /50 c 340°T / 25 d 055°T / 25

8 The sensitivity of a direct reading magnetic compass is:

a Inversely proportional to the horizontal component of the earth's magnetic field.

b Proportional to the horizontal component of the earth's magnetic field.

c Inversely proportional to the vertical component of the earth's magnetic field.

d Inversely proportional to the vertical and horizontal components of the earth's magnetic field.

9 An aircraft at position 60°N 005°W tracks 090° (T) for 315 km.

On completion of the flight the longitude will be:

a 002° 10'W b 000° 15'E c 000° 40'E d 005° 15'E

10 What is the definition of magnetic variation?

a The angle between the direction indicated by a compass and Magnetic North.

b The angle between True North and Compass North.

c The angle between Magnetic North and True North.

d The angle between Magnetic Heading and Magnetic North.

11 At the magnetic equator:

a Dip is zero **b Variation is zero**

c Deviation is zero **d The isogonal is an agonic line**

12 Which of these is a correct statement• about the Earth's magnetic field:

a It acts as though there is a large blue magnetic pole in Northern Canada

b The angle of dip is the angle between the vertical and the total magnetic force.

c It may be temporary, transient, or permanent.

d It has no effect on aircraft deviation.

13 Where is a compass most effective?

a About midway between the earth's magnetic poles

b In the region of the magnetic South pole

c In the region of the magnetic North pole

d On the geographic equator

14 The value of variation:

a is zero at the magnetic equator **b** has a maximum value of 180°

c has a maximum value of 45° E or 45° W **d** cannot exceed 90°

15 You are in the northern hemisphere, heading West, and the aircraft is accelerating. Will a direct reading magnetic compass over-read or under-read? Is the compass indicating a turn to the north or to the south?

	Compass	Indicating turn to
a	over-reads	north
b	over-reads	south
c	under-read	north
d	under-reads	south

16 What is the advantage of the remote indicating compass (slaved gyro compass) over the direct reading magnetic compass?

a It is lighter

b It is connected to a source of electrical power and so is more accurate

c It senses the earth's magnetic field rather than seeks it. So is more sensitive

d It is not affected by aircraft deviation

17 You are in the Northern hemisphere, heading 135° C on a Direct Reading Magnetic Compass. You turn right in a Rate 1 turn for 30 seconds. Do you roll out on an indicated heading of?

a Greater than 225 **b Less than 225**

c Equal to 225 **d Not possible to determine**

18 IRS differs from INS in that it:

a Has a longer spin-up time and is not affected by vertical accelerations due to gravity.

b Has a shorter spin-up time and suffers from laser lock.

c Does not need to correct for coriolis and central acceleration.

d Does not experience Schuler errors as accelerometers are strapped down and are not rotated by a VIR feedback loop.

19 The period of validity of an FMS database is:

a 56 days **b One week**

c 28 days **d Varies depending on the area of operational cover.**

20 In an IRS:

a The accelerometers are strapped down but the platform is gyro stabilised.

b The platform is strapped down but the accelerometers are gyro-stabilised.

c Accelerometers and platform are both gyro-stabilised.

d Accelerometers and platform are both strapped down.

21 When initial position is put into an FMS, the system:

a Rejects initial latitude error, but it will accept longitude error.

b Rejects initial longitude error, but it will accept latitude error.

c Rejects initial latitude or longitude error.

d Cannot detect input errors, and accepts whatever is put in.

22 In a ring laser gyro, the purpose of the dither motor is to:

a Enhance the accuracy of the gyro at all rotational rates.

b Overcome laser lock.

c Compensate for transport wander.

d Stabilise the laser frequencies.

23 The FMC position is:

a The average of the IRS positions

b The average of the IRS and radio navigation positions

c Computer generated from the IRS and radio navigation positions

d Computer generated from the radio navigation positions

24 Which of the following can all be stored as five letter waypoint identifiers through the CDU of a B737- 400 Electronic Flight Instrument System?

a Airway names; navaid identifiers; airport names; waypoint code numbers

b Waypoint names; navaid identifiers; runway numbers; airport ICAO identifiers

c Waypoint names; navaid frequencies; runway codes; airport ICAO identifiers

d Waypoint names; navaid positions; airport ICAO identifiers; airport names

25 The following waypoints are entered into an inertial navigation system (INS)

WPT 1: 60N 30W

WPT 2: 60N 20W

WPT 3: 60N 10W

NAVIGATION QUESTIONS For CPL/ ATPL

The inertial navigation is connected to the automatic pilot on the route WP1 – WP2 – WP3. The track change on passing WPT 2 will be approximately:

a a 9° increase **b** a 4° decrease

c zero **d** a 9° decrease

26 What is the source of magnetic variation information in a Flight Management system (FMS)?

a The main directional gyro which is coupled to the magnetic sensor (flux valve) positioned in the wing tip.

b Magnetic variation information is stored in each IRS memory; it is applied to the true heading calculated by the respective IRS

c Magnetic variation is calculated by each IRS based on the respective IRS position and the aircraft's magnetic heading

d The FMS calculates MH and MT from the FMC position

27 In the Boeing 737-400 FMS, the CDU is used to:

a manually initialise the IRS and FMC with dispatch information

b automatically initialise the IRS and FMC with dispatch information

c manually initialise the Flight Director System and FMC with dispatch information

d manually initialise the Flight Director System, FMC and Autothrottle with dispatch information

28 What are the levels of message on the Boeing 737-400 FMC?

a Urgent and Routine **b Priority and Alerting**

c Alert and Advisory **d Urgent and Advisory**

29 An INS platform is kept at right angles to local gravity by applying corrections for the effects of:

i Aircraft manoeuvres

ii earth rotation

iii transport wander

iv coriolis

v gyroscopic inertia

a i, iii and v **b ii, iii and v**

c ii, iv and v **d i, ii, iii and iv**

30 When and where are IRS positions updated?

a during all phases of flight

b only on the ground during the alignment procedure

c when the FMS is in IRS ONLY NAV operation

d when the VHF Nav Radios are selected to AUTO

31 An aircraft equipped with an Inertial Navigation system (INS) flies with INS 1 coupled with autopilot 1. Both inertial navigation systems are navigating from waypoint A to B. The inertial systems' CDU s show:

XTK on INS 1 = 0

XTK on INS 2 = 8L

From this information it can be deduced that:

a only inertial navigation No I is drifting

b only inertial navigation No 2 is drifting

c at least one of the inertial navigation systems is drifting

d the autopilot is unserviceable in NA V mode

32 Aircraft position determined by radio navigation in the Boeing 737-40 0 FMC is derived from:

a VOR/DME **b DME ranges and / or VOR / ADF bearings**

c VOR/ADF **d VOR / DME and DME / DME**

33 On a triple-fit IRS system, present positions on the CDU:

a will only differ if one IRS has been decoupled due to a detected malfunction

b will only differ if an initial input error of aircraft position has been made –

c are likely to differ as the information comes from different sources

d will not differ as the information is averaged

34 Gyro-compassing in an INS:

a is possible in flight as the gyros can differentiate between acceleration due to aircraft movement and initial alignment errors

b is not possible in flight as the gyros can differentiate between acceleration due to aircraft movement and initial alignment errors

c is not possible in flight as the gyros cannot differentiate between acceleration due to aircraft movement and initial alignment errors

d is possible in flight as the gyros cannot differentiate between acceleration due to aircraft movement and initial alignment errors

35 What are the positions (in the order left to right) on the Boeing 737-400 IRS MSU mode selector?

a OFF STBY ALIGN NAV

b OFF ON ALIGN NAV

c OFF STBY ATT NAV

d OFF ALIGN NAV ATT

36 An aircraft leaves at 0900UTC on a 250 nm journey with a planned groundspeed of 115 knots. After 74 nm the aircraft is 1.5 minutes behind the planned schedule. What is the revised ETA at the destination?

a 1100 b 1110 c 1115 d 1054

37 In an INS /IRS, an azimuth gyro is found to have a drift rate. If t is the time since selecting the MSU from ALIGN to Navigate, is the azimuth gyro heading error

a Proportional to t b Proportional to t^2

c Proportional to t/2 d sinusoidal

38 In an INS / IRS, an azimuth gyro is found to have a drift rate. 1ft is the time since selecting the MSU from ALIGN to NAVigate, is the position error

a Proportional to t b Proportional to t2

c Proportional to tI2 d sinusoidal

39 Laser lock is overcome in an IRS system by using a piezo-electric motor which utilises the principle of:

a shake b SAGNAC c dither d vibration

40 A B C

1 30 nm 1 20 nm 1

ATA A is 1010. ETA B is 1030. ETA C is 1043.

ATA B is 1027. What is revised ETA C?

a 1040 b 1043 c 1038 d 1036

41 Isogrivs are lines that connect positions that have

a the same grivation **b the same variation**

c 0° magnetic dip **d the same horizontal magnetic field strength**

42 An aircraft at position 6000N 00522W flies 165 km due East. What is the new position?

a 6000N 00820E **b 6000N 00224W**

c 6000N 00108E **d 6000N 00108W**

43 An aircraft at latitude 0220N tracks 180°T for 685 kilometres. What is its latitude at the end of the flight?

a 0350S **b 0250S** **c 0210S** **d 0855S**

44 What is the average magnetic course and distance between 6000N 02000W and Sumburgh VOR? (in the exam they gave an attached chart as an Annex – for revision practice use your Jeppesen Manual chart AT(H/L) 1 or 5 AT(HI))

	Course	Dist
a	**095**	**562**
b	**095**	**468**
c	**105**	**562**
d	**105**	**468**

45 What is the average true track and distance between WTD NDB (5211.3N 00705.0W) and FOY NDB (5234.0N 00911.7W) – use your Jeppesen E (LO) l

	Track	Dist
a	294	76
b	286	76
c	294	81
d	286	81

46 An aircraft is flying TAS 180 knots and tracking 090°T. The W/V is 045/50. How far can the aircraft fly out from its base and return within 1 hour?

a 74 nm b 85 nm c 102 nm d 111 nm

47 You are flying a VFR route and have become uncertain of your position. Which is the best course of action?

a set heading towards a line feature – coastline, river, or motorway

b turn round and fly your flight plan tracks in reverse until you see something you recognised before

c fly a series of ever-expanding circles from your present position till yon find-your next check point

d Turn round and fly your flight plan in reverse back to base

48 An aircraft is at FL140 with an IAS of 210 and a true OAT of -5°C. The wind component is -35 knots. When the aircraft is at 150 nm from a reporting point, ATC request the crew to lose 5 minutes by the time they get to the beacon. How much do they need to reduce IAS?

a 15 knots b 25 knots c 30 knots d 20 knots

49 An aircraft has a TAS300 knots and a safe endurance of 10 hours. If the wind component on the outbound leg is 50 knots head, what is the distance to the point of safe endurance?

a 1500 nm b 1458 nm c 1544nm d 1622 nm

50 An aircraft has a TAS of 300 knots and is over a stretch of water between 2 airfields 500 nm apart. If the wind component is 60 knots head, what is the distance from the first airfield to the critical point?

a 250 nm b 200 nm c 300 nm d 280 nm

NAVIGATION QUESTIONS

51 X Y Z

1 30 nm 1 20nm 1

ATA X is 1420. ETA Y is 1447. ATA Y is 1450.

What is new ETA Z?

a 1506 b 1512 c 1510 d 1515

52 Given:

Airport elevation is 1000 feet.

QNH is 988 hPa

What is the approximate airport pressure altitude?

a 320 b 1680 c -320 d 680

53 An aircraft starts at position 0410S 17822W and heads true north for 2950 nm, then turns 90 degrees left, and maintains a rhumb line track for 314 kilometers. What is its final position?

a 5500N 17422W b 4500N 17422W

c 5500N 17738E d 4500N 17738E

54 You are heading 0800T when you get a range and bearing fix from your A WR on a headland at 185 nm 30° left of the nose. What true bearing do you plot on the chart?

a 050 from the headland, using the headland's meridian

b 050 from the headland, using the aircraft's meridian

c 230 from the headland, using the headland's meridian

d 230 from the headland, using the aircraft's meridian

55 By what amount must you change your rate of descent given a 10 knot increase in headwind on a 3° glideslope?

a 50 feet per minute increase b 30 feet per minute increase

c 50 feet per minute decrease d 30 feet per minute decrease

56 In which months is the difference between apparent noon and mean noon the greatest?

a November and February b January and July

c March and September d June and December

57 5 hours 20 minutes and 20 seconds hours time difference is equivalent to which change of longitude?

a 81° 30′ b 78° 15′ c 79° 10′ d 80° 05′

58 The main reason that day and night, throughout the year, have different durations is due to the:

a earth's rotation

b relative speed of the sun along the ecliptic

c inclination of the ecliptic to the equator

d gravitational effect of the Sun and the Moon on the speed of rotation of the Earth

59 A Lamberts Conical conformal chart has standard parallels at 63N and 41N. What is the constant of the cone?

a .891 b .788 c .656 d .707

60 On a chart, 49 nautical miles is represented by 7.0 centimetres. What is the scale?

a 1/700,000 b 1/2,015,396

c 1 / 1,296,400 d 1/1,156,600

61 On a Direct Mercator chart, great circles are shown as:

a Curves convex to the nearer pole b Straight lines

c Rhumb lines d Curves concave to the nearer pole

62 The scale on a Lambert's conformal conic chart

a is constant along a meridian of longitude

b is constant along a parallel of latitude

c varies slightly as a function of latitude and longitude

d is constant across the whole map

63 Heading is 156°T, TAS is 320 knots, W/V is 130/45. What is your true track?

a 160 b 152 c 104 d 222

64 You are heading 345°M, the variation is 20°E, and you take a radar bearing of 30° left of the nose from an island. What bearing do you plot?

a 160°T b 155°T c 140°T d 180°T

65 Your pressure altitude is FL55, the QNH is 998, and the SAT is + 30C. What is Density Altitude?

a 6980 feet b 7750 feet

c 8620 feet d 10020 feet

66 On a particular take-off, you can accept up to 10 knots tailwind. The runway QDM is 047, the variation is l7°E and the A TIS gives the wind direction as 210. What is the maximum wind strength you can accept?

a 18 knots b 11 knots c 8 knots d 4 knots

67 The agonic line:

a is midway between the magnetic North and South poles

b follows the geographic equator

c is the shorter distance between the respective True and Magnetic North and South poles

d Follows separate paths out of the North polar regions, one currently running through Western Europe and the other through the USA

68 On a 12% glide slope, your groundspeed is 540 knots. What is your rate of descent?

a 6550 feet/min **b 4820 feet/min**

c 8740 feet/min **d 3120 feet/min**

69 At 65 nm from a VOR you commence a descent from FL330 in order to arrive over the VOR at FL 100. Your mean groundspeed in the descent is 240 knots. What rate of descent is required?

a 1420 feet/min **b 1630 feet/mm**

c 1270 feet/min **d 1830 feet/min**

70 In which month does aphelion occur?

a January b March c July d November

71 The term drift refers to the wander of the axis of a gyro in?

a any plane **b the horizontal plane**

c the vertical plane **d the vertical and horizontal plane**

72 What is the highest latitude listed below at which the sun will rise above the horizon and set every day?

a 68°N b 66°N c 62°N d 72°N

73 The pressure alt is 29000 feet and the SAT is -55°C. What is density altitude?

a 27500 feet b 26000 feet

c 30000 feet d 31000 feet

74 The distance from A to B is 2368 nautical miles. If outbound groundspeed in 365 knots and homebound groundspeed is 480 knots and safe endurance is 8 hours 30 minutes, what is the time to the PNR?

a 290 minutes b 209 minutes

c 219 minutes d 190 minutes

75 What is the UTC time of sunrise in Vancouver, British Columbia, Canada (49N 123 30W) on the 6th December? (In the exam, tables were supplied. The answers given below are based on the tables in your Gen Nav notes).

a 2324 UTC b 0724 UTC

c 1552 UTC d 0738 UTC

76 How does scale change on a normal Mercator chart?

a Expands as the secant 2 (2 co-latitude)

b Expands directly with the secant of the latitude

c Correct on the standard parallels, expands outside them, contracts within them

d Expands as the secant of the EIW great circle distance

77 You are on ILS 3-degree glideslope which passes over the runway threshold at 50 feet. Your DME range is 25 nm from the threshold. What is your height above the runway threshold elevation? (Use the I in 60 rule and 6000feet = 1 nautical mile)

a 8010 feet **b 7450 feet**

c 6450 feet **d 7550 feet**

78 At 1200 Standard Time on the 10th July in Queensland, Australia, what is the Standard Time in Hawaii, USA?

a 1200 ST 10 July **b 1000 ST 10 July**

c 1600 ST 09 July **d 0200 ST 10 July**

79 You are flying at a True Mach No of .82 in a SAT of -45°C. At 1000 hours you are 100 nm from the POL DME and your ETA at POL is 1012. ATC ask you to slow down to be at POL at 1016. What should your new TMN be if you reduce speed at 100 nm distances to go?

a M.76 **b M.72** **c M 68** **d M 61**

80 The relative bearing to a beacon is 270(R). Three minutes later, at a groundspeed of 180 knots, it has changed to 225°R. What was the distance of the closest point of approach of the aircraft to the beacon?

a 45 nm **b 18 nm** **c 9 nm** **d 3 nm**

81 Groundspeed is 540 knots. 72 nm to go. What is time to go?

a 8 mins **b 9 mins** **c 18 mins** **d 12 mins**

82 An aircraft at position 2700N 17000W travels 3000 km on a track of 180°T, then 3000 km on a track of 090°T, then 3000 km on a track of 000°T, then 3000 km on a track of 270°T. What is its final position?

a 2700N 17000W

b 0000N/S 17000W

c 2700N 17318W

d 2700N 14300W

83 An aircraft at FL370 is required to commence descent at 120 NM from a VOR and to cross the facility at FL130. If the mean GS for the descent is 288 kt, the minimum rate of descent required is:

a 920 ft/min

b 890 ft/min

c 860 ft/min

d 960 ft/min

84 You are homing to overhead a VORTAC and will descend from 7500 QNH to be 1000 AMSL by 6 nm DME. Your groundspeed is 156 knots and the ROD will be 800 feet/min. At what range from the VORTAC do you commence the descent?

a 27.1 nm **b 15.8 nm** **c 11.7 nm** **d 30.2 nm**

85 A Rhumb line is:

a the vertex of a conformal polyformic projection

b a straight line on a Lambert's conformal chart

c a line on the Earth which cuts all meridians at the same angle

d the shortest distance between two points on the Earth's surface

86 You fly from 49N to 58N along the 180 E/W meridian. What is the distance in kilometres?

a 540 km **b** 804 km **c** 1222 km **d** 1000 km

87 On a particular Direct Mercator wall chart, the 180°W to 180°E parallel of latitude at 53N is 133 cm long. What is the scale of the chart at 30S?

a 1: 3,000,000 **b** 1: 18,000,000

c 1: 21,000,000 **d** 1: 27,000,000

88 What is the highest latitude on the Earth at which the Sun can be vertically overhead?

a 23½ ° **b** 66 ½ ° **c** 45° **d** 90°

89 Track = 090 (T), T AS = 460 knots, W /V = 360 (T) /100,

Variation = 10 E, Deviation = -2.

What is compass heading and groundspeed?

a 079° 470 knots **b** 069° 450 knots

c 068° 460 knots **d** 070° 455 knots

90 The angle between True North and Magnetic north is known as:

a deviation **b** variation

c alignment error **d** dip

91 An aircraft is at 10° N and is flying South at 444 km/hour. After 3 hours the latitude is:

a 10° S **b** 02°N

c 02° S **d** 00°N/S

92 Given that:

A is N55° E/W 000°

B is N54° E 010°,

If the true great circle track from A to B is 100° T, what is the true Rhumb Line track at A?

a 096° **b** 107°

c 104° **d** 100°

93 The circumference of the Earth is approximately:

a 43200 nm **b** 10800 nm

c 21600 nm **d** 5400 nm

94 The angle between the plane of the Equator and the plane of the Ecliptic is:

a 66.5° **b** 23.5°

c 25.3° **d** 65.6°

95 Position A is at 70S 030W, position B is 70S 060E. What is the Great Circle track of B from A measured at A?

a 132° T **b** 048° T

c 090° T **d** 228° T

96 The value of magnetic variation on a chart changes with time. This is due to:

a Movement of the magnetic poles, causing an increase

b Increase in the magnetic field, causing an increase

c Reduction in the magnetic field, causing a decrease

d Movement of the magnetic poles, which can cause either an increase or a decrease

97 Isogonal lines converge as follows:

a At the North Magnetic Pole

b At the North and South Magnetic and Geographical Poles

c At the North and South Magnetic Poles

d At the Magnetic equator.

98 Position A is 55N 30W. Position B is 54N 20W. The Great Circle track from A to B, measured at A, is 100°T. What is the Rhumb line bearing from A to B?

a 104°T b 090°T c 100°T d 284°T

99 An aircraft departs a point 0400N 17000W and flies 600 nm South, followed by 600 nm East, then 600 nm North, then 600 nm West. What is its final position?

a 0400N 17000W b 0600S 17000W

c 0400N 169° 58.1 'W d 0400N 170° 01.8'W

100 Why are the detector units of slaved gyro compasses usually located in the aircraft wingtips?

a **With one detector unit in each wingtip, compass deviations are cancelled out.**

b **To isolate the detector unit from the aircraft deviation sources.**

c **To isolate the detector unit from the Earth's magnetic field.**

d **To reduce turning and acceleration errors.**

NAVIGATION QUESTIONS

101 At 1000 hours an aircraft is on the 310 radial from a VOR/DME, at 10 nautical miles range. At 1010 the radial and range are 040/10 nm. What is the aircraft's track and groundspeed?

a **0800 / 85 knots** **b** **0850 / 85 knots**

c **0800 / 80 knots** **d** **0850 / 90 knots**

102 A straight line is drawn on a North Polar Stereographic chart joining Point A (7000N 06000W) to Point B (7000N 06000E). What is the initial track direction (going eastwards) of the line at A ?

a **090° T** **b** **030° T** **c** **120° T** **d** **330° T**

103 What is the maximum possible value of Dip Angle?

a **66°** **b** **180°** **c** **90°** **d** **45°**

104 Given:

Magnetic heading 311°

Drift is 10° left

Relative bearing of NDB 270

What is the magnetic bearing of the NDB measured from the aircraft?

a 221° b 208° c 211° d 180° .

105 What is the Standard Time in Hawaii when it is 0600 ST on the 16th July in Queensland, Australia?

a 1100 ST on the 15th b 2000 ST on the 15th

c 1100 ST on the 16th d 1000 ST on the 17th

106 What is the weight in kilogrammes of 380 US Gallons at a Specific Gravity of 0.78?

a 1123 b 2470 c 5434 d 543

107 You leave A to fly to B, 475 nm away, at 1000 hours. Your ETA at B is 1130. At 1040, you are 190 nm from A. What groundspeed is required to arrive on time at B?

a 317 knots b 330 knots c 342 knots d 360 knots

108 Which of the following differences in latitude will give the biggest difference in the initial Great Circle track and the mean Great Circle track between two points separated by 10° change of longitude?

a 60N and 60S b 60N and 55N

c 30S and 30N d 30S and 25S

109 An aircraft is at 5530N 03613W, where the variation is 15W. It is tuned to a VOR located at 5330N 03613W, where the variation is 12W. What VOR radial is the aircraft on?

a 348 b 012 c 165 d 015

110 The wind velocity is 359/25. An aircraft is heading 180 at a TAS of 198 knots. (All directions are True). What is its track and groundspeed?

a 180 223 **b 179 220**

c 180 220 **d 179 223**

111 An aircraft's compass must be swung:

a If the aircraft has been in the hangar for a long time and has been moved several times.

b If the aircraft has been subjected to hammering.

c Every maintenance inspection

d After a change of theatre of operations at the same magnetic latitude.

112 Civil Twilight occurs between:

a Sunset and 6° below the horizon **b 6° and 12° below the horizon**

c 12° and 18° below the horizon **d Sunrise and sunset**

113 What is the dip angle at the South Magnetic Pole?

a 0° **b 90°** **c 180°** **d 64°**

114 What is a line of equal magnetic variation?

a An isocline **b An isogonal**

c An isogriv **d An isovar**

115 What is the reason for seasonal changes in climate?

a Because the Earth's spin axis is inclined to the plane of its orbit round the Sun

b Because the distance between the Earth and the Sun varies over a year

c Because the Earth's orbital speed round the Sun varies according to the time of the year

d Because of the difference between the Tropical Year and the Calendar Year

116 What is the Rhumb Line track from A (4500N 01000W) to B (4830N 01500W)?

a 315° T b 330° T c 215° T d 150° T

117 What is the effect on the Mach number and T AS in an aircraft that is climbing with constant CAS?

a Mach number decreases; TAS decreases

b Mach number increases; TAS remains constant

c Mach number increases; TAS increases

d Mach number remains constant; TAS increases

118 The direct reading magnetic compass is made aperiodic (dead beat) by:

a using long magnets

b keeping the magnetic assembly mass close to the compass point and using damping wires

c pendulous suspension of the magnetic assembly

d using the lowest acceptable viscosity compass liquid

119 An island is observed to be 15° to the left.

The aircraft heading is 120° (M), variation 17° (W).

The bearing (° T) from the aircraft to the island is:

a 268 b 302 c 088 d 122

120 An aircraft is flying around the Earth eastwards along the 60N parallel of latitude at a groundspeed of 240 knots. At what groundspeed would another aircraft have to fly eastwards along the Equator to fly once round the Earth in the same journey time?

a 600 knots b 240 knots

c 480 knots d 120 knots

121 If it is 0700 hours Standard Time in Kuwait, what is the Standard Time in Algeria?

a 0500 hours b 0900 hours

c 1200 hours d 0300 hours

122 If variation is West; then:

a True North is West of Magnetic North

b Compass North is West of Magnetic North

c True North is East of Magnetic North

d Magnetic North is West of Compass North

123 At what latitude does the maximum difference between geodetic and geocentric latitude occur?

a 0° b 45° c 60° d 90°

124 At what times of the year does the length of the hours of daylight change most rapidly?

a Spring Equinox and Autumn Equinox b Summer Solstice and Winter Solstice

c Spring Equinox and Summer Solstice d Autumn Equinox and Winter Solstice

125 Given: Aircraft height = 2500 feet, ILS GP angle = 3°, at what approximate distance from the threshold can you expect to intercept the glide-path?

a 8.0 nm b 14.5 nm c 13.1 nm d 7.0 nm

126 Convert 70 metres/see into knots.

a 136 knots b 36 knots c 146 knots d 54 knots

127 In which of the following projections does a plane surface touch the Reduced Earth at one of the Poles?

a Gnomic b Stereo graphic c Lambert's d Direct Mercator

128 Which of the following conversions from True to Compass is the correct one?

	T	V	M	D	C
a	130	2W	132	-1	131
b	130	2E	132	-1	133
c	130	2W	132	-1	133
d	130	2E	132	-1	133

129 Your position is 5833N 17400W. You fly exactly 6 nm eastwards. What is your new position?

a 5833N 17411.5W **b 5833N 17355W**

c 5833N 17340W **d 5833N 17348.5W**

130 TAS = 240 knots. Track is 180°T. The relative bearing from an NDB is 315R at 1410. At 1420 the bearing has changed to 270R. What is your distance from the NDB at 1420?

a 40 nm **b 50 nm** **c 60 nm** **d 70 nm**

131 Given:

True Track = 352

Variation = 11W

Deviation = -5

Drift = 10 R

What is Heading (C?

a 078 C **b 346 C** **c 358 C** **d 025 C**

132 What is the definition of EAT?

a Estimated on-blocks arrival time b Estimated time overhead the destination airfield

c Estimated initial approach fix time d Estimated final approach fix time

133 Given that the value of ellipticity of the Earth is 1/297 and that the semi-major axis of the Earth, measured at the axis of the Equator is 6378.4 Km, what is the semi-major axis of the Earth measured at the axis of the Poles?

a 6399.9 Km **b 6356.9 Km**

c 6378.4 Km **d 6367.0 Km**

134 On a chart, meridians at 43N are shown every 10 degrees apart. This is shown on the chart by a distance of 14 cm. What is the scale?

a 1: 2,000,000 **b 1: 4,000,000**

c 1: 5,000,000 **d 1: 6,000,000**

135 On a Transverse Mercator chart, scale is exactly correct along the?

a Equator, parallel of origin and prime vertical **b meridian of tangency**

c datum meridian and meridian perpendicular to it. **d prime meridian and the equator.**

136 How do Rhumb lines (with the exception of meridians) appear on a Polar Stereographic chart?

a concave to the nearer pole **b convex to the nearer pole**

c an ellipse round the pole **d straight lines**

137 What is the value of convergence on a polar stereographic chart?

a 0 **b 1.0** **c 0.866** **d 0.5**

138 At 0422 you are 185 nm from a VOR at FL 370. You need to descend at a mean descent rate of 1800'/min to be at FL 80 overhead the VOR. Your groundspeed in the level cruise is currently 320 knots. In the descent your mean G/S will be 232 knots. What is the latest time to commence descent?

a 0437 b 0441 c 0444 d 0451

139 Given: Heading 165(M), Variation 25W, Drift 10° R, G/S 360 knots. At 'A' your relative bearing to an NDB is 325R. Five minutes later, at 'B', the relative bearing is 280R. What is the True Bearing and Distance from 'B' to the NDB?

a 060°T 40nm b 105°T 30nm

c 060°T 30nm d 105°T 40nm

140 What is the diameter of the Earth?

a 40000 km b 12732 km

c 21600 km d 6366 km.

141 An aircraft on the Equator accelerates whilst traveling westwards. What will be the effect on a direct reading compass?

a Indicates an increase in heading b No change

c Indicates a decrease in heading d Indicates an apparent turn to the North

142 An aircraft flies 100 st mile in 20 minutes. How long does it take to fly 215 nm?

a 50 mins b 37 mins

c 57 mins d 42 mins

143 What is the duration of civil twilight?

a From the moment when the centre of the sun is on the sensible horizon until the centre reaches a depression angle of 6° from the sensible horizon.

b From the moment when the tip of the sun disappears below the sensible horizon until the centre reaches a depression angle of 6° from the sensible horizon.

c From the moment when the centre of the sun is on the visual horizon until the centre reaches a depression angle of 6° from the sensible horizon.

d From the moment when the tip of the sun disappears below the visual horizon until the centre reaches a depression angle of 6° from the sensible horizon.

144 What is the shortest distance between Point 'A' (3543N 00841E) arid Point 'B' (5417N 17119W)?

a 5400 nm b 6318 nm

c 6557 nm d 6000 nm

145 Scale on a Lambert conformal chart is:

a constant along a line of latitude b constant along a line of longitude

c constant everywhere d correct at the parallel of origin

146 Given: TAS = 375 Trk = 335°T W/V=340°T/50

What is heading and Groundspeed?

a 335°T 322 b 335°T 318

c 336°T 326 d 333°T 326

147 Lines of latitude on a chart are always:

a Great Circles **b** Small Circles except for the Equator

c Vertices **d** Meridians

148 On a Lambert chart, the constant of the cone is .78585. What is the parallel of tangency?

a 51°02′ **b** 51°36′ **c** 51°15′ **d** 51°48′

149 On which chart projection is it not possible to show the North Pole?

a Direct Mercator **b** Lamberts

c Transverse Mercator **d** Polar Stereographic

150 You are at FL 150 and the SAT is -5°C. You are over an airport with an elevation of 720 feet.

The QNH is 1003. Assume 27 feet = 1HPa.

What is your true height?

a 14300 feet **b** 15300 feet

c 14700 feet **d** 15600 feet

151 What is the formula for Conversion Angle?

a Change of longitude x Sine latitude

b Change of longitude x ½ Sine mean longitude

c Change of longitude x ½ Sine mean latitude

d Change of longitude x Cosine latitude

152 On the Polar Stereographic projection, a Great Circle appears as:

a a straight line

b a curve which becomes more near to a straight line as the latitude increases

c a curve convex to the nearer pole

d a curve which can be concave or convex to the nearer pole, depending on the latitude

153 An aircraft departs Guam (13N 145E) at 2300 Standard Time on 30th April. Flight Time to Los Angeles, California, USA (34N 118W) is 11 hours 15 minutes. What is the California Standard Time of arrival? Assume Summer Time is being kept.

a 1015 ST 30 Apr **b 1715 ST 01 May**

c 1015 ST 01 May **d 1715 ST 30 Apr**

(NB the Standard time Difference for Guam is 10 hours – not given in our version of the Air Almanac, but the right page will be available in the exam).

154 What rate of descent is required to maintain a 3.5° glideslope at a groundspeed of 150 knots?

a 850 fpm b 800 fpm c 600 fpm d 875 fpm

155 What is the meaning of the term 'standard time'?

a It is another term for UTC

b It is the time zone system applicable only in the USA.

c It is an expression for local mean time.

d It is the time set by the legal authorities for a country or part of a country.

156 On 27 Feb at 52°S 040″E sunrise is a 0243UTC. On the same day at 52°S 035°W the time of sunrise is?

a 0743 UTC b 0243 UTC c 2143 UTC d 0543 UTC.

157 A compass swing is performed in order to correct for?

a acceleration b deviation c variation d aperiodicity

158 Isogonals are lines of equal:

a compass deviation b magnetic variation

c wind velocity d pressure

159 On a Direct Mercator chart, a rhumb line appears as a:

a small circle concave to the nearer pole b straight line

c curve convex to the nearer pole d spiral curve

160 Given:

IAS 120 kt

FL 80

OAT +20°C

What is the TAS?

a 141 kt b 102 kt c 120 kt d 132 kt

161 The distance between two waypoints is 200 NM.

To calculate compass heading the pilot used 2°E magnetic variation instead of 2°W. Assuming that the forecast W/V applied, what will the off track distance be at the second waypoint?

a 14 NM b 7 NM c 0 NM d 21 NM

162 Given:

True Course 300°

Drift 8°R

Variation 10°W

Deviation -4°

Calculate the compass heading.

a 322° b 306° c 278° d 294°

163 Given:

True track 180°

Drift 8°R

Compass Heading 195°

Deviation -2°

Calculate the variation.

a 21°W b 25°W c 5°W d 9°W

164 Given the following:

Magnetic heading: 060°

Magnetic variation: 8°W

Drift angle: 4° right

What is the true track?

a 064° b 056° c 072° d 048°

165 An aircraft was over 'Q' at 1320 hours flying direct to 'R'.

Given:

Distance 'Q' to 'R' 016 NM

True air speed 480 knots

Mean wind component 'out' -90 kt

Mean wind component 'back' +75 kt

Safe endurance 10:00 HR

The distance from 'Q' to the Point of Safe Return (PSR) is:

a 2370 NM b 2290 NM c 1510 NM d 1310 NM

166 Given:

Half way between two reporting points the navigation log gives the following information:

TAS 360 kt

W/V 330°/80 kt

Compass heading 237°

Deviation on this heading -5°

Variation 19°W

What is the average ground speed for this leg?

a 403 kt b 354 kt c 373 kt d 360 kt

167 When visually navigating, you cross 2 parallel roads approximately at right angles to track, about 1 nm apart. The time difference between crossing these roads can be used to derive:

a track b drift c groundspeed d heading

168 The angle between the true great-circle track and the true rhumb-line track joining the following points: A (60S 165W) and B (60S 177E) at the place of departure A, is?

a 9° b 15.6° c 5.2° d 7.8°

169 Given: Runway direction 083° (M), Surface W/V 035/35kt. Calculate the effective headwind component.

a 24 kt b 27 kt c 31 kt d 34 kt

170 Given: For take-off an aircraft requires a headwind component of at least 10 kt and has a cross-wind limit of 35 kt. The angle between the wind direction and the runway is 60°. Calculate the maximum and minimum allowable wind speeds.

a 20 kt and 40 kt **b** 15 kt and 43 kt

c 12 kt and 38 kt **d** 18 kt and 50 kt

171 From the departure point, the distance to the point of equal time is:

a proportional to the sum of ground speed out and ground speed back

b inversely proportional to the total distance to go

c inversely proportional to ground speed back

d inversely proportional to the sum of ground speed out and ground speed back

Appendix C to Gen Nav Feedback

Line No	Time	Course / Track (T)	W/V	HDG (T)	VAR	HDG (M)	POSITION FROM	POSITION TO	CAS/ MACH	FL/ OAT	TAS	GS	DIST	TIME	ETA
1	1015	270	050/40		7E		A	B	210	180/ -20			300		
2	1050	180	320/50		5W		C	D	175	160/ -10			480		

3	1125	090	140/60	10W	E	F	M 0.82	360/-40	300
4	1210	360	315/70	10E	G	H	M 0.78	310/-35	600
5	1245	330	240/30	17W	J	K	150	100/-10	275
6	1355	070	020/60	11W	L	M	M 0.84	390/-55	495

ANSWERS

1=C	**31=C**	**61=A**	**91=C**	**121=A**	**151=C**
2=C	**32=D**	**62=B**	**92=C**	**122=C**	**152=B**
3=B	**33=C**	**63=A**	**93=C**	**123=B**	**153=D**
4=D	**34=C**	**64=B**	**94=B**	**124=A**	**154=D**
5=C	**35=D**	**65=C**	**95=A**	**125=A**	**155=D**
6=A	**36=C**	**66=B**	**96=D**	**126=A**	**156=A**
7=A	**37=A**	**67=D**	**97=B**	**127=B**	**157=B**
8=B	**38=B**	**68=A**	**98=A**	**128=C**	**158=B**
9=C	**39=C**	**69=A**	**99=C**	**129=D**	**159=B**
10=C	**40=C**	**70=C**	**100=B**	**130=A**	**160=A**
11=A	**41=A**	**71=B**	**101=B**	**131=C**	**161=A**
12=A	**42=B**	**72=B**	**102=B**	**132=C**	**162=B**
13=A	**43=A**	**73=A**	**103=C**	**133=B**	**163=A**

14=B	**44=C**	**74=A**	**104=A**	**134=D**	**164=B**
15=A	**45=D**	**75=C**	**105=A**	**135=B**	**165=B**
16=C	**46=B**	**76=B**	**106=A**	**136=A**	**166=A**
17=A	**47=A**	**77=D**	**107=C**	**137=B**	**167=C**
18=B	**48=D**	**78=C**	**108=B**	**138=C**	**168=D**
19=C	**49=B**	**79=D**	**109=B**	**139=C**	**169=A**
20=D	**50=C**	**80=C**	**110=A**	**140=B**	**170=A**
21=C	**51=C**	**81=A**	**111=B**	**141=B**	**171=D**
22=B	**52=B**	**82=C**	**112=A**	**142=A**	
23=C	**53=D**	**83=D**	**113=B**	**143=D**	
24=B	**54=C**	**84=A**	**114=B**	**144=A**	
25=D	**55=C**	**85=C**	**115=A**	**145=A**	
26=B	**56=A**	**86=D**	**116=A**	**146=C**	
27=A	**57=D**	**87=D**	**117=C**	**147=B**	
28=C	**58=C**	**88=A**	**118=B**	**148=D**	
29=D	**59=B**	**89=B**	**119=C**	**149=A**	
30=B	**60=C**	**90=B**	**120=C**	**150=C**	

Arunaksha Nandy

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ATPL/ CPL Navigation Questions(3)

THE EARTH

1. Which of the following statements is true of a great circle?

a) It is the path radio waves that travel over the Earth

b) The smaller arc of it represents the shortest distance between two points on the Earth

c) Its plane passes through the center of the Earth

d) All of these

2. Which of the following statements is false of a small circle?

a) A radio wave never follows a small circle path

b) The smaller arc of it does not represent the shortest distance between two points on the Earth

c) Its plane does not pass through the center of the Earth

d) All lines of latitude are small circles

3. The latitude of a place is its angular distance:

a) N/S of the Equator to a maximum of 180◦ N/S

b) E/W of the Equator to a maximum of 90◦ E/W

c) N/S of the Equator to a maximum of 90◦ N/S

d) E/W of the Equator to a maximum of 180◦ E/W

4. The dlat and dlong between A (64◦33'S 120◦36'W) and B (10◦27'N 113◦24'E) is:

	dlat	dlong
a)	**75◦00'**	**126◦00'**
b)	54◦06'	07◦12'
c)	75◦00'	07◦12'
d)	54◦06'	126◦00'

5. Which of the following statements is false about a rhumb line?

1. a) It is a line of constant direction on the Earth's surface
2. **b) All lines of latitude Rhumb lines but not great circles**

3. c) All meridians are Rhumb lines and semi great circles

4. d) If the Rhumb line bearing of A from B is 090◦(T), the Rhumb line bearing of B from A is 270◦(T)

6. Which of the following statements about Earth convergency is false?

a) It is the angle that any two meridians converge on the Earth

b) It is the angle that a great circle bearing changes as it passes across two meridians

c) The angle of Earth convergency between meridians at the Equator is dlong

d) The angle between two meridians at the pole is dlong

7. The formula for Earth conversion angle is:

a) 2 x Earth Convergency

b) ½ dlong x sine Mean Latitude

c) dlong x sine Mean Latitude

d) dlong x cosine Mean Latitude

8. Which of the following statements about departure is false?

a) It is measured in nautical miles

b) It is the distance E/W between two meridians

c) Its formula is dlong x sine lat

d) Its value at the Equator is dlong converted to minutes of arc

9. C is in the same hemisphere as D. The Great Circle bearing of D from C is 044◦(T) and of C from D is 220◦(T). The hemisphere of C and D, and the Rhumb line track from C to D are:

Hemisphere	Rhumb Line C to D
a) Northern	040◦
b) Southern	**042◦**
c) Southern	044◦
d) Northern	046◦

10. The Great Circle track from A (20◦00'N 10◦00'W) to B (40◦00'N 175◦00'E) is 060◦(T). The Great Circle track from A to B is:

a) 240◦(T)

b) 245◦(T)

c) 250◦(T)

d) 230◦(T)

11. Calculate the convergency of meridians between 30◦North 175◦East and 30◦North 165◦West to the nearest whole degree

a) 5◦

b) 10◦

c) 17◦

d) 9◦

12. A is at 5500N 15100W and B at 5500N 16253W. what is departure?

a) 584 NM

b) 397 NM

c) 567 NM

d) 409 NM

13. Consider the following statement on the shape of the Earth:

a) The diameter of the Earth is the same at all latitudes

b) The longest diameter is between the poles

c) It is slightly flattened at the poles

d) The diameter at the Equator is about 60 NM longer than the diameter between poles

14. Consider the following statement on the longitude:

a) Longitude is stated in degrees upto 360◦

b) The value of longitude will never exceed 90◦

c) The largest value of longitude is 180◦

d) The largest value of change of longitude is 90◦

ATPL/ CPL Navigation Questions

DIRECTIONS, MAGNETISM AND SPEED

1. Directions are stated:

a) As a reference direction and a number of degrees

b) In degrees with reference to True North when plotted with reference to the latitude/longitude grid on a chart

c) In degrees in a 360◦ system, starting out clockwise from the reference direction

d) All 3 answers are correct

2. The angular difference between Compass North and Magnetic North is:

a) Variation

b) Deviation

c) Inclination

d) Magnetic Correction

3. The angular difference between the geographical meridian and magnetic meridian running through the same position is:

a) Variation

b) Deviation

c) Inclination

d) Magnetic Correction

4. Given Variation 6◦E, Deviation 4◦W, Heading 136◦True. What is the compass heading?

a) 130

b) 138

c) 134

d) 126

5. Variation in a position is 13◦W, and True track is 136◦. Consider the following statements:

a) The compass track is 149◦

b) The magnetic track is 149◦

c) Looking North from this position, ther Magnetic North pole seems to be locatedto the east of the true north pole

d) The position most likely is located at northern latitudes and on eastern latitudes

6. In the areas close to the magnetic poles, magnetic compasses are not to any use in air navigation, mainly because:

a) The field strength of the Earth's magnetic field is at it's weakest in this area

b) The distance from the Magnetic Equator is too long

c) The horizontal component of the Earth's magnetic field is too weak

d) The inclination is insufficient in these areas

7. The red end of a direct reading compass needle will point:

a) North and upwards in the northern hemisphere

b) North and upwards in the southern hemisphere

c) South and downwards in the southern hemisphere

d) South and upwards in the southern hemisphere

8. Dip is the angle between:

a) The H and Z components measured from the vertical

b) The Z component and the earth's magnetic field measured upwards

c) The H and Z components measured from the horizontal

d) The H component and the earth's magnetic field measured from the horizontal

9. True Heading is 355◦(T), Variation is 12◦W, Compass Heading is 002◦(C). The magnetic heading of the aircraft is ——- and the deviation is ———

a) 343◦(M) 7◦W

b) 343◦(M) 19◦E

c) 007◦(M) 5◦W

d) 007◦(M) 5◦E

10. Compass Heading is 237◦(C), magnetic heading is 241◦(M) with the variation 12◦W:

a) Deviation is 4◦W and True North is east of Compass North

b) Deviation is 4◦E and Compass North is west of True North

c) Deviation is 4◦W and Magnetic North is east of Compass North

d) Deviation is 4◦E and True North is west of Compass North

THE TRIANGLE OF VELOCITIES

1. Consider the following statements:

a) The exact length of a 1’ of arc is longer at high altitude than at sea level, when the arc is observed from the centre of the Earth

b) In any position on the surface of the Earth, the length of 1’ of arc East/West is equal to the length of 1’ of arc North/South in the same position on a perfect sphere

c) The exact length of a 1’ of arc varies a little from position to position because the Earth radius vary

d) All 3 statements are correct

2. Given True course 300◦, Drift 8◦R, Variation 10◦W, Deviation -4◦. Calculate compass heading?

a) 306◦

b) 322◦

c) 294◦

d) 278◦

3. 1 Nautical Mile equals:

a) 1855 metres

b) 6076 feet

c) 0.869 Statute Mile

d) 3281 Yards

4. Given Drift angle 4◦R, Magnetic Variation 8◦W, Magnetic Heading 060◦. What is the true track?

a) 072◦

b) 064◦

c) 048◦

d) 056◦

5. 265 US-GAL equals: (Specific gravity 0.80)

a) 862 kg

b) 895 kg

c) 940 kg

d) 803 kg

6. Kilometre is defined as:

a) The mean length of a 1/40000 part of the Equator

b) A 1/10000 part of the meridian length from Equator to the pole

c) 0.621 Statute Mile

d) 0.454 Nautical Mile

1. Construct the triangle of velocities showing the following data: TH 305◦, TAS 135 kt W/V 230/40, Period of time from 1130 to 1145. What is the track in this period of time?

a) 310◦

b) 290◦

c) 322◦

d) 316◦

8. Given TAS 110 kt, True heading 020◦, Actual wind 330◦(T)/36 kt. Calculate the drift angle and GS.

a) 15◦ Left – 97 kt

b) 15◦ Right – 97 kt

c) 17◦ Right – 91 kt

d) 17◦ Left – 91 kt

9. Construct the triangle of velocities showing the following data: TH 305◦, TAS 135 kt W/V 230/40, Period of time from 1130 to 1145. What is the GS in this period of time?

a) 130 kt

b) 135 kt

c) 145 kt

d) 97 kt

10. Flying on a true heading of 207◦, TAS is 158 kt, W/V is 310/25. Calculate true track.

a) 190◦

b) 215◦

c) 207◦

d) 198◦

11. Given TAS 290 kt, True heading 070◦, Actual wind 010◦(T)/40 kt. Calculate the drift angle and GS.

a) Drift angle 8◦ Left, GS 273 kt

b) Drift angle 7◦ Right, GS 260 kt

c) Drift angle 7◦ Right, GS 273 kt

d) Drift angle 7◦ Left, GS 273 kt

ATPL/ CPL Navigation Questions

CHARTS

1. If an earth distance of 100NM is represented on a chart by a line 7.9 inches long, the length of a line in inches representing 50 km is:

a) 2.00

b) 2.13

c) 2.18

d) 2.20

2. A what distance in mm would 2 fixes taken 20 minutes apart appear on a 1:1 000 000 Scale chart if the GS was 180 kt.

a) 108

b) 96

c) 111

d) 103

3. A Mercator has a scale of 1:6 000 000 at the Equator. How many statute miles are represented by 5 inches at 60◦S?

a) 948

b) 474

c) 237

d) 711

4. A straight line drawn on a chart measures 5.827 inches and represents 148 km. The chart scale is:

a) 1:500 000

b) 1:1 000 000

c) 1:1 500 000

d) 1:2 000 000

5. On a constant scale chart 1.28 inches represents 88 NM. The scale is:

a) 1:2 000 000

b) 1:5 000 000

c) 1:100 000

d) 1:1 500 000

6. On a Mercator chart the distance between 60◦N 017◦W and 60◦N 019◦W is 8 inches. The chart distance between 00◦N/S 017◦W and 00◦N/S 019◦W would be:

a) 4 inches

b) 8 inches

c) 16 inches

d) 9.24 inches

1. The scale of a chart is 1:730 000. How many cm on the chart are equivalent to 37 NM on the Earth?

a) 3.2

b) 0.3

c) 9.4

d)10.6

8. The scale of a chart is 1:500 000. How many inches on the chart are equivalent to 127 km on the Earth?

a) 100

b) 10

c) 18.5

d)24.5

9. A straight line on a chart of 9 inches is equivalent to 432 NM on the Earth. The chart scale is:

a) 1:2 000 000

b) 1:2 500 000

c) 1:5 000 000

d) 1:3 500 000

10. A straight line on a chart of 25.4 cm is equivalent to 137 NM. What is the scale?

a) 1:1 000 000

b) 1:500 000

c) 1:1 500 000

d) 1:2 000 000

11. The scale of a chart is 1:185 320. A straight line drawn on this chart is 15 cm. What is the equivalent length of this line on the Earth in NM?

a) 25

b) 30

c) 15

d) 45

12. The scale of a chart is 1:729 600. A straight line drawn on this chart is 8.9 cm. What is the equivalent length of this line on the Earth in NM?

a) 29

b) 35

c) 45

d) 60

1. Chart convergency on a Mercator chart is:

a) ½ dlong x Sin Lat

b) dlong x Cos Lat

c) zero

d) dlong x Cos parallel of origin

14. On a Mercator chart, chart convergency equals earth convergency:

a) At the parallel of origin

b) At the Equator

c) At the parallel of tangency

d) All of these

15. On a Mercator chart the scale at 60◦ south compared with the scale at 30◦ south is:

a) Greater

b) The same

c) Smaller

d) 1/3 smaller

16. On a Mercator chart a rhumb line is:

a) A curve concave to the Pole

b) A curve concave to the Equator

c) A straight line

d) A curve concave to the central meridian

17. On a Mercator chart a great circle between two points is:

a) A straight line

b) A curve convex to the nearer pole

c) A curve convex to the Equator

d) Always on the equatorial side of the rhumb line between them

18. The scale of a Mercator chart is 1:5 000 000 at its parallel of origin. What is the scale at 60◦ North?

a) 1:10 000 000

b) 1:7 500 000

c) 1:5 000 000

d) 1:2 500 000

19. The scale of a Mercator chart is 1:4000 000 at 30◦ North. What is the scale at 60◦ North?

a) 1:200 000

b) 1:230 000

c) 1:695 000

d) 1:800 000

20. The scale of a Mercator chart is 1:730 000 at the Equator. What is the chart length to the nearest inch between meridians 3 degrees apart at 481/2◦ North?

a) 2

b) 18

c) 180

d) 20

21. On a Mercator chart the rhumb line track from A (20◦S 20◦W) to B (40◦S 40◦W) is 220◦(T). What is the great circle bearing of A from B?

a) 035◦(T)

b) 215◦(T)

c) 045◦(T)

d) 225◦(T)

22. On a Lamberts chart, chart convergency equals earth convergency:

a) At the Equator

b) The Poles

c) At the standard parallels

d) At the parallel of origin

23. On a Lamberts chart, the true appearance of a great circle (other than a meridian) is:

a) A straight line

b) A curve convex to the nearer pole

c) A curve convex to the parallel of origin

d) A curve concave to the parallel of origin

24. On a Lamberts chart, the published scale is correct:

a) At the Equator

b) The Poles

c) At the standard parallels

d) At the parallel of origin

25. On a Lamberts chart, scale is least:

a) At the Equator

b) The Poles

c) At the standard parallels

d) At the parallel of origin

26. The chart convergency on a Lamberts conical conformal chart is stated as being equal to the change of longitude x 0.5. A straight line track drawn on this chart from A (30◦S 107◦W) to B (42◦50'S 125◦W) measures 224◦(T) at A. Calculate:

The approximate rhumb line track from A to B is:

a) 233 ½◦(T)

b) 228 ½◦(T)

c) 219 ½◦(T)

d) 215◦(T)

27. The Great Circle bearing of A from B is:

a) 054◦(T)

b) 045◦(T)

c) 036◦(T)

d) 049.5◦(T)

28. The constant of the cone of a Lamberts conical conformal chart is given as 0.75. A straight line drawn from C (45◦N 60◦W) to E in 10◦W passes through D in 28◦W. The direction of the track is 055◦(T) at C. Calculate:

The direction of the straight line track C to E, measured at D, is:

a) 067◦(T)

b) 079◦(T)

c) 055◦(T)

d) 031◦(T)

29. The approximate rhumb line track from C to D is:

a) 067◦(T)

b) 079◦(T)

c) 055◦(T)

d) 043◦(T)

30. The approximate rhumb line track from C to E is:

a) 098◦(T)

b) 036◦(T)

c) 093◦(T)

d) 074◦(T)

1. The approximate rhumb line track from D to E is:

a) 062◦(T)

b) 086◦(T)

c) 074◦(T)

d) 072◦(T)

32. A straight line track is drawn on a polar stereographic chart from A (85◦N 80◦W) to B (85◦N 130◦E). Calculate:

The track angle (◦T) A to B measured at A is:

a) 345

b) 015

c) 165

d) 195

33. The track angle (◦T) B to A measured at B is:

a) 345

b) 015

c) 165

d) 195

34. The track angle (◦T) A to B measured at 180◦E/W is:

a) 065

b) 085

c) 245

d) 155

35. The longitude at which the track angle A to B measures 270◦(T) is:

a) 035◦E

b)155◦E

c) 035◦W

d) 155◦W

36. For gyro steering purposes a polar stereographic chart is overlaid with a rectangle grid aligned with the Greenwich (prime) meridian. The Track angle, expressed in degrees grid, when the aircraft is at position 82◦N 113◦W on a track of 205◦(T) is:

a) 318

b) 113

c) 092

d) 138

1. For gyro steering purposes a polar stereographic chart is overlaid with a rectangle grid aligned with the Greenwich (prime) meridian. The Track angle, expressed in degrees grid, when the aircraft is at position 70◦N 60◦E on a track of 090◦(T) is:

a) 150

b) 030

c) 330

d) 210

38. An aircraft at DR position 66◦N 29◦W obtains an ADF bearing of 141◦ (relative) from an NDB at position 64◦N 22◦W. The aircraft heading is 352◦(M), the variation at the NDB is 15◦W and at the aircraft 12◦W. Calculate:

The bearing to plot, on a Mercator chart, from the meridian passing through the NDB:

a) 124◦

b) 298◦

c) 304◦

d) 308◦

39. The bearing to plot, on a polar stereographic chart, from the meridian passing through the NDB:

a) 121◦

b) 294◦

c) 301◦

d) 308◦

40. The bearing to plot, on a Lamberts conformal conic chart having standard parallels at 37◦N and 65◦N, from the meridian passing through the NDB is:

a) 126 ½◦

b) 306 ½◦

c) 295 ½◦

d) 304◦

41. An aircraft at DR position 63◦S 47◦E obtains an RMI reading of 228 from a VOR at position 67◦S 39◦E. The aircraft heading is 025◦(M), the variation at the VOR is 15◦E and at the aircraft 11◦E. Calculate:

The position line to plot, on a Mercator chart from the meridian passing through the VOR is:

a) 055 ½◦

b) 056◦

c) 059 ½◦

d) 066 ½◦

42. The position line to plot, on a polar stereographic chart from the meridian passing through the VOR is:

a) 048◦

b) 059◦

c) 063◦

d) 033◦

43. The position line to plot, on a Lamberts conformal conic chart having a parallel of origin at 55◦S, from the meridian passing through he VOR is:

a) 048◦

b) 059◦

c) 063◦

d) 033◦

44. A Lamberts conformal conic chart and a transverse Mercator chart covering the same area of the Earth's surface both have nominal scale of 1:3 000 000. The standard parallels of the Lamberts chart are at 25◦N and 45◦N and the central meridian of the transverse Mercator chart is 40◦E. Using this information, answer the following:

At position 50◦N 40◦E:

a) The Lambert chart has the larger scale

b) The transverse Mercator has the larger scale

c) Both charts have the same scale

d) Insufficient information is given to answer this question

45. At position 25◦N 50◦E:

a) The Lambert chart has the larger scale

b) The transverse Mercator has the larger scale

c) Both charts have the same scale

d) Insufficient information is given to answer this question

46. At position 30◦N 30◦E:

a) The Lambert chart has the larger scale

b) The transverse Mercator has the larger scale

c) Both charts have the same scale

d) Insufficient information is given to answer this question

47. At position 45◦N 40◦E:

a) The Lambert chart has the larger scale

b) The transverse Mercator has the larger scale

c) Both charts have the same scale

d) Insufficient information is given to answer this question

48. On a polar stereographic chart, Earth convergency is correctly represented:

a) At all points on the chart

b) At the Equator

c) At the pole

d) At the meridian of tangency

49. On a polar stereographic chart, a straight line is drawn from 70◦S 115◦W to 70◦S 125◦E. Using this information, answer the following:

The initial direction (◦T) of this straight line track is:

a) 330

b) 060

c) 130

d) 210

50. The final direction (◦T) of this straight line track is:

a) 210

b) 330

c) 060

d) 130

51. The longitude of the most southerly point on the straight line track is:

a) 175◦W

b) 180◦E/W

c) 175◦E

d) 165◦W

52. On the chart, the most southerly point on this straight line track will appear to be:

a) At a lower latitude than 80◦S

b) At 80◦S

c) At a higher latitude than 80◦S

d) At a higher latitude than 85◦S

53. For gyro steering purposes a polar stereographic chart is overlaid with a rectangle grid so that 000◦(G) coincides with 000◦(T) along the 060◦E meridian.The track angle expressed in ◦(G), at position 80◦N 10◦W with the aircraft making good a track of 300◦(M), local magnetic variation 25◦E, is:

a) 255

b) 335

c) 345

d) 035

1. With an aircraft on a heading of 125◦(T) the relative bearing of an NDB is determined as 310◦. Given that the difference in longitude between the aircraft and the NDB is 6◦ and that the mean latitude between the aircraft and NDB is 68◦S, answer:

The bearing to plot, on a Mercator chart, from the meridian passing through the NDB is:

a) 252◦

b) 255◦

c) 258◦

d) 261◦

55. The bearing to plot, on a polar stereographic chart, from the meridian passing through the NDB is:

a) 255◦

b) 261◦

c) 252◦

d) 249◦

56. The bearing to plot, on a Lamberts conformal conic chart (parallel of origin 48◦S), from the meridian passing through the NDB is:

a) 249◦

b) 255◦

c) 250 ½◦

d) 259 ½◦

SOLAR SYSTEM and TIME

1. What is the UTC/GMT of sunset in Hong Kong (22◦19N 114◦ 12◦E) on 24th July?

a) 0221 25th July

b) 1044 24th July

c) 1107 24th July

d) 0244 25th July

2. Given the ST of the beginning of Evening Civil Twilight at Port Stanley (Falkland Islands) (51◦42'S 57◦ 51'W) on 23rd July?

a) 1613 23rd July

b) 1713 23rd July

c) 1539 23rd July

d) 1629 23rd July

3. The times of sunrise, sunset as given in the Air Almanac are with reference to:

a) LMT for the observer's meridian

b) ST for the observer's meridian

c) GMT for the observer's meridian

d) UTC for the observer's meridian

4. In the Air Almanac twilight tables, the symbol //// means that:

a) Twilight lasts all day

b) The sun remains continuously above the horizon

c) The sun remains continuously below the horizon

d) Twilight lasts all night or day

5. The LMT of sunrise at Lat 00◦30’S Long 47◦20’W on 4th December is:

a) 0451 LMT

b) 0640 LMT

c) 0256 LMT

d) 0545 LMT

6. The LMT of the beginning of evening civil twilight at Lat 50◦00’S Long 120◦15’E on 25th December is:

a) 1641 LMT 25th December

b) 2055 LMT 25th December

c) 0412 LMT 26th December

d) 2011 LMT 25th December

1. The LMT of sunrise at 35◦00’S 28◦00’E on 4th December is:

a) 0410

b) 0439

c) 0621

d) 0652

8. The GMT of Evening Civil Twilight at 46◦19’N 035◦34’E on 26th July is:

a) 1751

b) 2238

c) 1754

d) 2016

9. The duration of Morning Civil Twilight at 66◦48’N 095◦26’W on 2nd December is:

a) 94 min

b) 90 min

c) 84 min

d) 80 min

1. The Standard Time of sunset at Hong Kong (22◦20’N 114◦ 10’E) on 31st Dec is:

a) 0126 1st Jan

b) 1726 31st Dec

c) 1749 31st Dec

d) 1759 31st Dec

11. The LMT of the end of Evening Civil Twilight in latitude 71◦00’N on 19th Dec is:

a) 1330

b) 1301

c) 1350

d) 1400

12. For an observer in the Norfolk Island (29◦00’S 167◦55’E) the LMT of sunset on 16th July is:

a) 1900

b) 1720

c) 1742

d) 1927

1. For an observer in the Lord Howe Island (31◦31’S 159◦04’E) the LMT of sunrise and the duration of morning civil twilight on the 6th August are:

SUNRISE	DURATION
a) 0519	34 min
b) 0647	25 min
c) 0503	34 min
d) 0644	**25 min**

14. The duration of Evening Civil Twilight at Moscow (56◦00’N 037◦23’E) on the 14th December was:

a) 13

b) 37

c) 47

d) 42

1. A flight departed Boston (Massachusetts, USA, 42◦22’N 071◦00’W), two hours after sunset on 16th September. The flight time to Brussels (Belgium, 50◦55’N 004◦31’E) was 6 hours 30 minutes. The UTC time and date of departure was:

a) 16th 2023

b) 17th 0053

c) 17th 0823

d) 16th 1224

16. The UTC of sunrise at 54◦00’N 010◦00’E on 10th July is:

a) 0308

b) 0224

c) 0300

d) 0344

17. In Hong Kong (22◦19’N 114◦12’E), the UTC of sunset on 24th July is:

a) 0221 25th July

b) 1044 24th July

c) 1107 24h July

d) 0244 25th July

18. For an observer at 62◦50’N 048◦57’W on the 7th July, the local time of sunrise is:

a) 0208

b) 0524

c) 2252

d) does not rise

19. An observer in Korea (38◦00’N 133◦00’E) watches the sunset on 13th August local date. The duration of evening civil twilight would be:

a) 25 min

b) 38 min

c) 27 min

d) 20 min

1. An observer in Korea (38◦00’N 133◦00’E) watches the sunset on 13th August local date. The time of sunset expressed as GMT would be:

a) 0350 14th

b) 0350 13th

c) 1006 13th

d) 1006 14th

21. An observer in Korea (38◦00’N 133◦00’E) watches the sunset on 13th August local date. The time of sunset expressed as Standard Time would be:

a) 1906 14th

b) 1858 14th

c) 1858 13th

d) 1906 13th

22. In its path around the Sun, the axis of the Earth has an inclination:

23. a) Varying between zero and 23◦27’ with the plane of the path

24. **b) Of 66◦33’ with the plane**

25. c) Varying with the season of the year

26. d) Of 23◦27’ with the plane of Equator

23. The Sun’s declination is on a particular day 12.00 S. Midnight Sun may this day be observed:

a) North of 7800S

b) South of 7800S

c) At 7800S only

d) North of 7800N

24. The term ‘sidereal’ is used:

a) To describe how two positions of heavenly bodies are located sideways on the sky

b) To describe conditions with reference to the moon

c) To describe a situation or relationship concerning the stars

d) To describe the time interval between two successive transits of the real apparent Sun at the same meridian

25. The mean Sun:

a) Is the middle position of the Sun

b) Has a declination equal to the apparent Sun

c) Moves with constant speed along the celestial Equator

d) Is only of interest to users of astronomical navigation

26. A day at a place as measured in local mean time starts:

a) When the mean sun transits the meridian of the place in question

b) When the mean sun transits the Greenwich meridian

c) When the mean sun transits the anti meridian of the place in question

d) When the mean sun transits the 180E/W meridian

27. The inclination of the Earth's axis of rotation with the plane of the ecliptic:

a) Is causing the variation of length of the day during a year

b) Is stable throughout the year

c) Is causing the seasons, summer and winter

d) All 3 answers are correct

28. As seen from an observer on the surface of the Earth:

a) The sun is in a fixed position relative to the stars

b) The stars will seem to move from west to east during a year

c) The sun's position relative to the stars is fixed throughout the year

d) The apparent sun is always in the plane of the ecliptic

29. If the Mean Sun moves 121◦ 30' along the Equator, that equals:

a) 20 hours 10 minutes

b) 9 hours 15 minutes

c) 6 hours 20 minutes

d) 8 hours 06 minutes

30. The direction of the Earth's rotation on its axis is such that:

a) Observed from the point above the North Pole, the rotation is counterclockwise

b) An observer on the surface of the Earth always will face west when observing sunrise

c) Any point on the surface of the Earth will move eastward

d) Any point on the surface of the Earth will move westward

31. When the Sun's declination is northerly:

a) It is winter on the Northern Hemisphere

b) The sunrise occurs earlier at southern latitudes than northern latitudes

c) The daylight period is shorter on the Southern Hemisphere

d) Midnight sun may be observed at the South Pole

32. The length of an apparent solar day is not constant because:

a) The Earth's speed in its orbit varies continuous, due to the orbit being elliptical

b) The Earth's speed of rotation is not the same at all latitudes

c) The Sun's declination is not constant

d) The Earth is moving with constant speed around the Sun

33. By the term 'transit' of a heavenly body it is understood that:

a) The body is moving

b) The body is passing the meridian of the observer or another specified meridian

c) The body is passing the anti meridian of the observer

d) The body is at the same celestial meridian as another body

34. Atmospheric refraction:

a) Causes the sunrise and the sunset to occur earlier

b) Causes the sunrise and the sunset to occur later

c) Causes the sunrise to occur later and the sunset to occur earlier

d) Causes the sunrise to occur earlier and the sunset to occur later

35. When approaching the International Date Line from East longitude, you:

a) Should be prepared to increase your date by 1

b) Should increase your date by an extra date at the first midnight you experience

c) Should be prepared to decrease your date by 1

d) Should not change date at the first midnight you experience

36. The duration of twilight:

a) Will in the period around the Equinoxes increase as you approach the Equator from North or South

b) Is generally longer in positions at high latitudes than in positions at lower positions

c) Is independent of the sun's declination and only depends on the observer's latitude and longitude

d) Is longer in the morning than in the evening because of the refraction in the atmosphere

PRACTICAL NAVIGATION

1. A ground feature is observed in line with the wing tip whilst flying at 300 kt GS. After 5 minutes the same feature is 7◦ behind the wing tip. What is the aircraft distance from the ground feature? (Use 1:6 rule)

a) 230 NM

b) 214 NM

c) 150 NM

d) 164 NM

2. A fix indicates you are 70 NM from a ground feature that is in line with the wing tip. After 2 minutes the same feature is 3◦ behind the wing tip. What is your Ground Speed? (Use 1:6 rule)

a) 125 kt

b) 154 kt

c) 105 kt

d) 251 kt

3. A fix indicates you are 52 NM from a ground feature that is in line with the wing tip Whilst flying at 210 knots. After 1 minute how many degrees behind the wing will You see the ground feature? (Use 1:6 rule)

a) 4◦

b) 7◦

c) 8◦

d) 3◦

4. A ground feature is observed in line with the wing tip whilst flying at 180 kt GS. After 4 minutes the same feature is 5◦ behind the wing tip. What is the aircraft distance from the ground feature? (Use 1:6 rule)

a) 155 NM

b) 166 NM

c) 144 NM

d) 170 NM

5. A fix indicates you are120NM from a ground feature that is in line with the wing tip. After 2 minutes the same feature is 2◦ behind the wing tip. What is your Ground Speed? (Use 1:6 rule)

a) 100 kt

b) 110 kt

c) 130 kt

d) 120 kt

1. Kerry (5210.9N 00932.0W) is 41 NM DME. Galway (5318.1N 00856.5W) is 50 NM DME. What is your position? (Use chart E(LO)1)

a) 5242N 00827W

b) 5255N 00819W

c) 5219N 00809W

d) 5230N 00834W

7. What is the mean true track and distance from the BAL VOR (5318N 00627W) to CRN VOR/DME (5318N 00856W)? (Use chart E(LO)1)

a) 272 89

b) 272 88

c) 270 89

d) 270 88

8. You are on the 239 radial 36 NM from SHA VOR (5243N 00853W). What is your position? (Use chart E(LO)1)

a) 5212N 00915W

b) 5212N 00930W

c) 5215N 00930W

d) 5220N 00939W

9. What is the radial and DME distance from SHA VOR (5243N 00853W) to Birr Airport (5304N 00754W)? (Use chart E(LO)1)

a) 068M 40NM

b) 068M 42NM

c) 060M 40NM

d) 060M 42NM

10. What is the average track (◦T) and distance between WTD NDB (N5211.3 W00705.0) and FOY NDB (N5234.0 W00911.7)? Refer to E(LO)1

a) 277◦ – 83 NM

b) 286◦ – 81 NM

c) 294◦ – 80 NM

d) 075◦ – 81 NM

RELATIVE VELOCITY

1. Aircraft A is at FL350, TAS 440 kt with an equivalent wind component (EWC) of -50 kt and estimating TLA NDB at 0815. Aircraft B is on the same track at FL310, TAS 480 kt with a wind component of -30 kt and estimating TLA at 0820. The time at which aircraft B will overtake A is:

a) 0848

b) 0844

c) 0852

d) 0856

2. Aircraft A is at FL350, M0.82, OAT -55◦C with an EWC of +25 kt and estimating POL NDB at 1020. Aircraft B is on the same track at FL310, M0.82, OAT -46◦C with a wind component of +40 kt and estimating POL at 1022. The two aircraft will pass at:

a) 244 NM from POL

b) 232 NM from POL

c) 343 NM from POL

d) 299 NM from POL

3. Aircraft A passes over VOR ‘A’ at 1110 enroute to VOR ‘B’ 1232 NM away at a Groundspeed of 490 kt. Aircraft B reports VOR ‘B’ at 1123 on a reciprocal track with a Ground speed of 380 kt. The aircraft will pass at:

a) 1243

b) 1246

c) 1237

d) 1241

4. The distance from ‘A’ the aircraft in Question 140 will pass is:

a) 637 NM

b) 743 NM

c) 595 NM

d) 768 NM

5. An aircraft is cruising at M0.84, FL330, OAT -43◦C with a wind component of -30 kt and reports waypoint ‘G’ at 2230. ATC instructs the pilot to reduce speed to M0.76 at his discretion to be at waypoint ‘H’, 350 NM away, not before 2320.

The latest time at which the speed reduction can be made is:

a) 2230

b) 2237

c) 2233

d) 2241

6. Aircraft J is overhead YQT NDB at 0800 with a groundspeed of 300 kt. Aircraft K is following on the same track with a groundspeed of 360 kt and is overhead YQT at 0825. The time at which the aircraft will be 100 NM apart is:

a) 0832

b) 0825

c) 0850

d) 0856

7. The aircraft in Question 143 are routing to VBI VOR 196 NM from YQT. The minimum groundspeed reduction that aircraft K must make at YQT to be 120 NM behind J when J passes VBI is:

a) 115 kt

b) 21 kt

c) 63 kt

d) 39 kt

8. Use the following information to answer Questions 145, 146, 147: Aircraft A is overhead waypoint 1 at 2330 enroute to waypoint 2, 750 NM away at a groundspeed of 490 kt. Aircraft B checks waypoint 1 on the same track but 4000 ft lower at 2335 with a groundspeed of 535 kt. If no speed changes are made the distance from waypoint 1 that the aircraft will pass is:

a) 487 NM

b) 505 NM

c) 525 NM

d) 543 NM

9. Aircraft B is instructed to reduce speed to 490 kt to cross waypoint 2, 2 minutes after aircraft A. The latest time for speed reduction is:

a) 0003

b) 0008

c) 0013

d) 0018

10. At the point of speed reduction the separation of the two aircraft is:

a) 20 NM

b) 14 NM

c) 18 NM

d) 16 NM

11. Aircraft A, FL330, TAS 400 kt, EWC -30 kt, estimates point X at 1620. Aircraft B, FL 370, TAS 515 kt, EWC -40 kt, estimates point X at 1625. Both aircraft are on the same track. The time aircraft B will pass aircraft A is:

a) 1637½

b) 1642½

c) 1647

d) 1629

12. An aircraft with a GS of 300 kt is overhead J at 1100. This aircraft is followed by another at the same FL, GS 360 kt, which arrives overhead J at 1125. Both aircraft are following the same route to K, 220 NM from J. The first time the aircraft will be 120 NM apart is:

a) 1130

b) 1125

c) 1144

d) 1151

13. Aircraft X, GS 315 kt is over point C at 1200 on the direct track to D, 300 NM from At 1224 aircraft Y, flying the same route at the same FL, but with GS 405 kt passes over point C. At what time will the separation between the aircraft be 90 NM?

a) 1225

b) 1248

c) 1245½

d) 1224

14. An aircraft with a GS of 285 kt is overhead P at 0630. Another aircraft follows this aircraft, GS 318 kt, and reports overhead P 15 minutes later. Both aircraft are following the same track. Using the above information, answer the following question and Question 152. The time at which the distance between the aircraft has reduced to 40 NM is:

a) 0727

b) 0742

c) 0651

d) 0636

15. How far from P will the slower aircraft be at this time?

a) 270½ NM

b) 342 NM

c) 160 NM

d) 28 NM

1. On a flight from A to B, distance 720 NM, an aircraft whose GS is 360 kt is instructed to delay arrival by nine minutes. It is decided that this will be accomplished by reducing the GS by 60 kt. The minimum distance from B that this reduction can be carried out is:

a) 54 NM

b) 45 NM

c) 270 NM

d) 324 NM

17. On a flight from E to F, distance 720 NM, an aircraft, GS 250 kt is instructed to delay arrival by six minutes. This is to be accomplished by reducing the GS to 200 kt. The minimum distance from F that this reduction can be carried out is:

a) 130 NM

b) 25 NM

c) 100 NM

d) 125 NM

18. Aircraft A, TAS 402 kt, EWC -30 kt, estimates point Q at 2348. Aircraft B, TAS 455 kt, EWC -40 kt, estimates point Q at 2333. Both aircraft are on the same track. Using the above information, answer the following question and Question 156. What is the latest time aircraft A must reduce TAS to 366 kt so as to arrive overhead Q, 20 minutes after aircraft B?

a) 2241½

b) 2301½

c) 2313

d) 2257

19. How far from Q is aircraft B at the time calculated above:

a) 248 NM

b) 138 NM

c) 1,473 NM

d) 218 NM

20. An aircraft TAS 500 kt, HWC 78 kt, is requested not to cross position X, 630 NM away, before 1754. The request is made at 1612. What is the latest time at which the aircraft TAS can be reduced to 400 kt, in order to cross position X at 1754:

a) 1703

b) 1624

c) 1701

d) 1654

POINT OF SAFE RETURN AND POINT OF EQUAL TIME

1. Calculate the distance to the PSR from origin, point A, given:

Safe endurance	2.5 hours
TAS	200 kt
W/V	200◦/25 kt
Track A – B	047◦

1. a) 200 NM
2. b) 212 NM
3. c) 224 NM
4. **d) 246 NM**

2. Calculate the distance to the PSR from origin, point A, given:

Safe endurance	3 hours 54 minutes
Ground speed out	180 kt
Ground speed home	200 kt

1. a) 370 km

2. b) 390 NM
3. **c) 370 NM**
4. d) 390 km

3. Calculate the time to the PSR, given:

Safe endurance 3 hours

Ground speed out 170 kt

Ground speed home 185 kt

1. a) 1 hour 36 min
2. **b) 1 hour 34 min**
3. **c)** 1 hour 32 min
4. d) 1 hour

4. Calculate the distance to PSR, given:

Safe endurance 11 hours

Ground speed out 478 kt

Ground speed home 575 kt

1. a) 3871 NM
2. b) 2781 NM

3. c) 2500 NM
4. **d) 2871 NM**

5. Calculate the time and distance to the PSR given a turbojet aircraft requiring statutory reserve of 30 minutes given:

COAT	-47◦C
Mach	0.78
W/C Out	+ 140 kt
Trip distance	5100 NM
Total endurance	11 hours 30 minutes

3. a) 2625 NM 8 hours
4. b) 2225 NM 2 hours
5. **c) 2265 NM 8 hours**
6. d) 2100 NM 2 hours

6. How does the wind component affect the PSR? An increase or decrease in wind component will ———- the distance to the PSR?

1. a) Increase
2. **b) Decrease**
3. c) Not change
4. d) Increase or decrease

7. Calculate the distance to PSR, given:

TAS 450 kt

EWC Out -100 kt

Safe endurance 6 hours

1. a) 1283 NM
2. b) 1085 NM
3. **c) 1283 NM**
4. d) 1085 NM

8. Calculate the time to the PSR, given:

Safe endurance 6 hours 30 minutes

Ground speed out 225 kt

Ground speed home 145 kt

2. **a) 2.54 hours**
3. b) 2 hours 54 min
4. c) 30 hours
5. d) 2 hours 10 minutes

9. Calculate the distance to the PSR, given:

Safe endurance 10 hours

TAS 454 kt

W/V at 25 000ft	270◦/100 kt
Heading Out	090◦
Flight Level	250

1. a) 2100 NM
2. **b) 2160 NM**
3. c) 2200 NM
4. d) 2222 NM

10. What is the distance to PSR, given:

Safe endurance	4 hours
Ground speed out	140 kt
Ground speed home	90 kt

1. a) 193 NM
2. **b) 219 NM**
3. c) 229 NM
4. d) 232 NM

11. An aircraft departs point A to route via points B and C to get to D. Given the data below, where does the PSR lie in relation to A?

Sector	Distance	TAS	W/C
A-B	1000 NM	500 kt	+50
B-C	1500 NM	500 kt	-200

C-D	50 NM	500 kt	Zero

Total (ATC) Endurance 8 hours

Required Reserves 30 minutes

1. a) 1635 NM
2. **b) 1729 NM**
3. c) 1808 NM
4. d) 1812 NM

12. As far as the critical point is concerned, the PET always moves ———– wind.

1. **a) Into**
2. b) Out of
3. c) Because of
4. d) Around

13. An aircraft is in the cruise having departed point A at 1200 hours UTC. Aircraft systems are functioning properly. A passenger, however, has suffered from a major heart attack, and has not responded well to onboard treatment. The pilot has the option to use an (on-track) en-route alternate, and must decide whether to return to base or continue to the alternate. The pilot must therefore decide where he is in relation to PET for this type of emergency, in order to expedite a landing as soon as possible. Fuel is sufficient for any reasonable course of action. At what time will he calculate the PET should be / should have been reached?

Cruise speed (TAS) outbound 400 kt

Highest available safe cruise speed 430 kt

Distance from base to en-route alternate 2000 NM

Equivalent Wind Speed (out / in) +90 kt

(home) -90 kt

1. a) 1259 UTC
2. b) 1435 UTC
3. c) 1400 UTC
4. **d) 1337 UTC**

14. Given the following information, calculate the time taken to reach the PET:

A to B is 500 NM

TAS is 300 kt

EWC out / on -25 kt, back +30 kt

1. a) 30 minutes
2. b) 45 minutes
3. **c) 59 minutes**
4. d) 61 minutes

MAGNETISM AND COMPASSES

Magnetic Compass

1. Deviation due to vertical soft iron varies:

1. **a) Directly with the tangent of the dip angle**
2. b) Directly with H, the horizontal component of the Earth’s magnetic field
3. c) Directly with Z, the vertical component of the Earth’s magnetic field
4. d) Inversely with the tangent of the dip angle

2. Coefficient B is the sum of:

1. **a) P and cZ**
2. b) P and fZ
3. c) Q and cZ
4. d) Q and fZ

3. Coefficient C is the sum of:

a) P and fZ

b) P and cZ

c) Q and cZ

d) Q and fZ

4. A change in the deviation of the magnetic compass will occur with an increase of magnetic latitude because:

a) Residual dip increase with an increase in latitude

b) The Z component of the Earth's magnetic field increase with an increase in latitude

c) Horizontal hard iron increases with an increase in latitude

d) Horizontal hard iron decreases with an increase in latitude

5. When carrying out a compass swing, you must align:

a) True North and magnetic North

b) Magnetic North and compass North

c) True North and compass North

d) Compass lubber line and compass North

6. In a turn from 045◦ to 315◦ through North, in the Southern hemisphere, the movement of the magnet system of a direct reading compass when viewed from above, and the effect of liquid swirl caused by the movement, are:

Magnet System Liquid Swirl

a) Clockwise Reduce

b) Anti-clockwise Reduce

c) Clockwise Increase

d) Anti-clockwise Increase

1. During deceleration after a landing on a northerly runway in the Northern Hemisphere, the magnetic compass will indicate:

1. a) An apparent turn to the North

2. **b) No apparent turn**

3. c) An apparent turn to the South

4. d) A heading fluctuation about 360◦

8. What are the primary methods of achieving Horizontality, Sensitivity, and Aperiodicity in a Direct Reading Compass?

Horizontality Sensitivity Aperiodicity

1. **a) Low CG Jeweled pivot Wires in the fluid**

2. b) Low CG Large magnets Immerse in fluid

3. c) Strong magnets Immerse in fluid Damping filaments

4. d) High CG Jeweled pivot Damping filaments

9. If a turn is made from 130◦ to 230◦ with reference to a DGI, what will the DRC read on initial roll out?

1. a) 230◦ in the Northern hemisphere

2. **b) 210◦ in the Southern hemisphere**

3. c) 210◦ in the Northern hemisphere

4. d) 250◦ in the Southern hemisphere

PRESSURE INSTRUMENTS AND RADIO ALTIMETERS

1. With reference to an altimeter, what will be the effect if the static source becomes blocked during the climb:

1. a) It will indicate a large increase
2. **b) It will progressively under read**
3. c) It will indicate zero
4. d) It will progressively over read

2. If a servo altimeter has a quoted accuracy of 1 hPa, what is the accuracy at FL 300 and FL390:

1. **a) 70 ft and 105 ft**
2. b) 70 ft and 83 ft
3. c) 47 ft and 83 ft
4. d) 47 ft and 105 ft

3. When flying an aircraft from an area of warm air to an area of cold air, the altimeter will:

1. a) Under reads
2. b) Stays the same
3. **c) Over reads**
4. d) The instrument will act as a VSI

4. A vibrator may be fitted to an altimeter to overcome:

1. a) Aperiodicity

2. **b) Frictional lag**
3. c) Hysteresis
4. d) Horizontality

5. Lag in an IVSI is virtually eliminated by means of:

1. **a) An accelerometer system**
2. b) A vibrator
3. c) A bimetallic strip
4. d) A ceramic choke unit

6. A blockage occurs in the ram air source and drain hole, with the static source open. The airspeed indicator in a non-pressurised aircraft will:

1. a) Read a little high
2. **b) Act like an altimeter**
3. c) Read a little low
4. d) Freeze at zero

5. An airspeed indicator has a leak in the circuit supplying pitot air, what will be seen on the indicator:

1. a) Act as an altimeter
2. b) Over read
3. **c) Under read**
4. d) Remain affected

8. An ASI circuit consist of pressure sensors, the Pitot Probe measures:

1. a) Dynamic pressure
2. b) Total pressure
3. **c) Total pressure and Static pressure**
4. d) Static pressure

9. The CAS is obtained by applying to the IAS:

1. **a) An instrument and position/pressure error correction**
2. b) An instrument and density correction
3. c) A compressibility correction
4. d) A compressibility and density correction

10. The white arc on an ASI indicates:

1. **a) Vso at the lower end and Vfe at the upper end**
2. b) Vsi at the lower end and Vfe at the upper end
3. c) Vso at the lower end and Vno at the upper end
4. d) Vsi at the lower end and Vne at the upper end

11. Mach number is defined as the ratio of:

1. **a) TAS to LSS**
2. b) IAS to LSS
3. c) CAS to LSS
4. d) EAS to LSS

12. Which of the following instruments have a feed of pitot pressure:

I Altimeter

II ASI

III VSI

IV Mach meter

V ADC

1. a) All
2. b) II, III, IV and V
3. **c) II, IV and V**
4. d) II and IV
5. If the static vent becomes blocked during a descent:

I Altimeter will under read/Mach meter will under read

II VSI will indicate a climb/ASI will over read

III Mach meter will over read/VSI reduces to zero

IV ASI over reads/Altimeter over reads

V VSI indicates descent/Altimeter does not change

1. **a) III and IV**
2. b) I and V
3. c) III and V
4. d) II and I

14. A conventional Mach meter consists of:

1. **a) An ASI with an altitude capsule**
2. b) An ASI with a mach scale
3. c) An altimeter corrected for density
4. d) A VSI and altimeter combined

15. What does a Mach meter measure?

T = Total pressure, S = Static pressure, D = Dynamic pressure

1. **a) T – S/S**
2. b) D – S/S
3. c) D + S/T
4. d) D/T – S

16. What are the inputs of the Air Data Computer:

I TAT

II SAT

III Angle of attack

IV Static pressure

V Dynamic pressure

VI Pitot pressure

VII Electric power

1. **a) I, III, IV, VI and VII**
2. b) I, II, III, V and VII
3. c) I, III, V and VI
4. d) II, IV and V

17.A modern radio altimeter uses the frequency band:

1. a) HF
2. b) VHF
3. **c) SHF**
4. d) UHF
5. Which is the operation frequency for a radio altimeter?

1. a) 430,000MHz
2. **b) 4,300 MHz**
3. c) 430 MHz
4. d) 4.3 MHz

19. A radio altimeter is:

1. a) Ground based and measures true height
2. b) Aircraft based and measures true altitude
3. **c) Aircraft based and measures true height**
4. d) Ground based and measures true altitude

20. The radio altimeter is used for accurate height indication on modern transport aircraft between:

1. a) 50 ft and 2450 ft
2. b) 0 ft and 5000 ft
3. c) 50 ft and 5000 ft
4. **d) 0 ft and 2500 ft**

GYROS

1. An air driven DGI will have:

1. a) One degree of freedom and a horizontal axis
2. b) Two degrees of freedom and a vertical axis
3. c) One degree of freedom and a vertical axis
4. **d) Two degrees of freedom and a horizontal axis**

2. The properties of a gyroscopic flight instrument are:

I Rigidity

II Precession

III Inertia

IV Instability

1. a) I, II, III and IV
2. **b) I and II**
3. c) II and IV
4. d) I, II and III

3. The sources of error in a DGI are:

I Earth rate

II Transport wander

III Manufacture

IV Gimbal lock

V Rigidity

VI Precession

1. a) I, II, and III
2. b) I, II, III, IV, V, VI
3. **c) I, II, III and IV**
4. d) II, III, IV, V and VI

4. What will the drift rate of a frictionless gyro at a mean latitude of 30◦N traveling from 30◦W to 36◦W in two hours if the latitude nut is set for 50◦N?

2. a) +2.5◦/hour
3. **b) +5.5◦/hour**
4. c) -5.5◦/hour
5. d) +11.0◦/hour

5. A Gyro used in a Rate of turn and bank indicator will have:

a) Two degrees of freedom and a horizontal spin axis

b) One degree of freedom and a horizontal spin axis

c) Two degrees of freedom and a vertical spin axis

d) One degree of freedom and a vertical

1. The needle and ball of a TBI are both displaced to the right, what condition is shown:

1. a) A left turn with too much bank
2. b) A right turn with too little bank
3. **c) A right turn with too much bank**
4. d) A left turn with too little bank

7. What angle of bank is required for a Rate 1 turn for an aircraft traveling at 180 kt?

1. a) 10◦
2. b) 18◦
3. **c) 25◦**
4. d) 30◦

8. A Gyro used in an instrument which, provides roll and pitch information, has:

1. a) One degree of freedom and a horizontal spin axis
2. b) Two degrees of freedom and a horizontal spin axis
3. **c) Two degrees of freedom and a vertical spin axis**
4. d) One degree of freedom and a vertical spin axis

9. If an Aircraft carries out a 270◦ turn to the left, what will a classic AH indicate?

1. a) Nose up, bank left
2. **b) Nose down, bank left**
3. c) Nose up, bank right
4. d) Nose down, bank right

10. A gravity erector system is used to correct the errors on:

1. **a) An artificial horizon**

2. b) A directional compass
3. c) A gyromagnetic compass
4. d) A turn indicator

BASIC RADIO PRINCIPLES

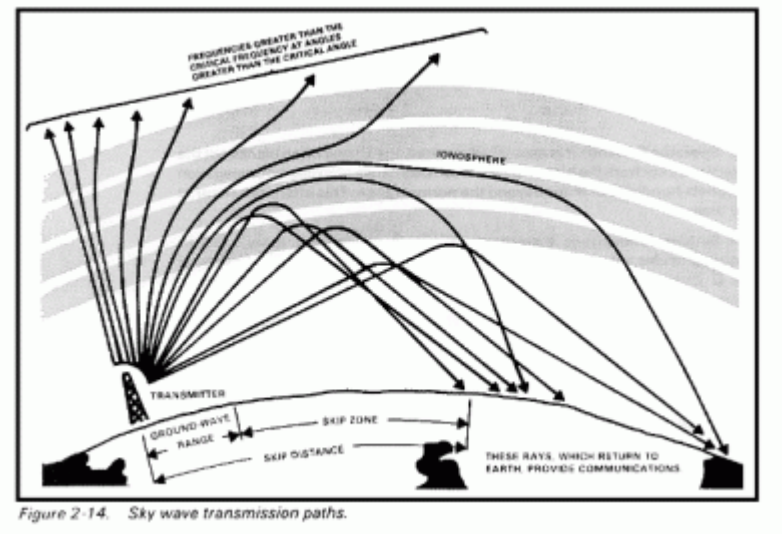

Figure 2-14. Sky wave transmission paths.

HF Transmission

1. The distance traveled by a radio wave in the direction of propagation during one cycle is:

1. a) Frequency
2. b) Polarisation
3. c) Cyclic range
4. **d) Wavelength**

2. The speed of radio waves in free space is:

1. a) 30 million m/s
2. b) 161 800 m/s
3. **c) 300 million m/s**
4. d) 1860 NM/s

3. The frequency corresponding to a wavelength of 1.4 km is:

1. a) 214 MHz
2. **b) 214 kHz**
3. c) 116 Hz

4. d) 4.7 kHz

4. A wavelength of 3 cm is equivalent to a frequency of:

1. a) 3 GHz
2. b) 300 GHz
3. c) 100 MHz
4. **d) 10 GHz**

5. A radio aid operating on a frequency of 114.95 MHz would be in the:

1. **a) VHF band**
2. b) UHF band
3. c) MF band
4. d) SHF band

6. Radio work is confined to a spectrum of frequencies between 3 kHz and 300 GHz mainly because:

a) Very high power inputs are necessary at extremely long wavelengths

b) Large aerials are required at extremely high frequencies, coupled with problems of static and attenuation of very long wavelengths

c) Atmospheric static affects very low frequencies also radio waves of extremely short wavelengths are severely attenuated

d) Both a) and c)

1. Attenuation of radio waves is usually caused by:

1. a) Absorption
2. b) Scattering
3. c) Geometrical dispersion
4. **d) Any or all of these**

8. The process by which the amplitude of a radio carrier wave is varied in sympathy with the amplitude & frequency of as audio wave is known as:

1. a) Frequency modulation
2. b) Pulse modulation
3. c) Phase modulation
4. **d) Amplitude modulation**

9. The bandwidth of a transmission is:

1. **a) Twice the maximum frequency of the modulating audio wave**
2. b) The width of one sideband
3. c) The difference between carrier and audio frequencies
4. d) Half the modulating frequency

10. The emission code for a VOR is:

1. **a) A9W**
2. b) F
3. c) A1A
4. d) A8W

11. The range at which ground waves can be received depends upon:

1. a) The frequency & power of transmission
2. b) Height of aerials and interference
3. c) Nature of terrain
4. **d) All of the above**

12. The principal source of attenuation in the ionosphere and of the refraction of VLF waves during daylight is:

1. **a) The ‘D’ layer**
2. b) The ‘E’ layer
3. c) The ‘F’ layer
4. d) All of these

13. Regarding HF communications, frequencies used by night are usually:

1. a) The same as daytime frequencies
2. **b) Lower than daytime frequencies**
3. c) Higher than daytime frequencies
4. d) Higher or lower depending on the strength of the ionosphere

14. Which of the following is attributed to VHF/UHF propagation?

1. **a) Direct waves super-refraction**
2. b) Direct waves ionosphere ducting
3. c) Ground waves ionosphere ducting
4. d) Sky waves ‘D’ layer attenuation

15. If the power of a transmitter is quadrupled, the range effectively would:

1. a) Increase 1.4 times
2. **b) Double**
3. c) Quadruple
4. d) Remain the same

16. What is the wavelength of a VOR?

1. **a) Metric**
2. b) Decimetric
3. c) Heximetric

4. d) Centimetric

17. If the strength of a radio signal decreases away from the transmitter, this effect is called:

1. **a) Attenuation**
2. b) Ducting
3. c) Refraction
4. d) Fading

18. What wavelength are used for NDB?

1. **a) Hectometric**
2. b) Metric
3. c) Centimetric
4. d) Decimetric

VHF DIRECTION FINDING

1. VDF for aeronautical use provides service in the frequency band:

1. a) 108 – 136 MHz
2. **b) 118 – 137 MHz**
3. c) 130 – 300 MHz

4. d) 108 – 118 MHz

2. The indicator of the ground VDF equipment responds to:

1. **a) The carrier wave received**
2. b) The identification transmitted from the aircraft
3. c) The voice modulated signal transmitted by the aircraft
4. d) The signal being reflected from the aircraft

3. If, when you are requesting a QDM from an airfield, you are offered a QGH, it means?

a) The VDF unit is prepared to give you assistance during an approach to the airfield, based on VDF bearings

b) The VDF service will be handled by a different VDF unit, operating on the same frequency

c) The bearing will only be accurate when the aircraft is flying above the QGH level

d) The service will be limited to bearings, no positions will be given by the DF station

4. A ground DF (VDF) station will normally provide the following bearings to an aircraft in flight:

1. **a) QTE/QDM**
2. b) QUJ/QNH
3. c) QNE/QNH
4. d) QDR/QFE

NDB AND ADF

1. The basic information given by the ADF is:

1. a) The magnetic bearing from the aircraft to the NDB
2. **b) The relative bearing from the aircraft to the NDB**
3. c) The true great circle track from the NDB to the aircraft
4. d) The magnetic direction of the loop aerial with reference to the sense aerial

2. Which of the following statements regarding an aeronautical NDB is correct?

a) It operates in the MF/HF band

b) To overcome the limitations caused by 'line of sight' propagation, high power transmitters must be used

c) It is very simple, transmitter being required to transmit only a carrier wave and identification

d) In Europe, most NDB's operate in the frequency band 455 – 1750 kHz

3. Which of the following is the ICAO allocated frequency band for ADF receivers?

a) 108.0 MHz – 117.9 MHz

b) 200 – 1750 MHz

c) 200 – 1750 Hz

d) 190 – 1750 kHz

4. Homing on an NDB:

a) Calls for an assessment of the drift

b) Is most effective in strong winds

c) Will in most situations result in frequent heading changes when approaching the NDB

d) Will result in passing the NDB along the planned track

5. Flying in the vicinity of CB clouds and using ADF:

a) The ANT position of the function switch can be used to listen for NDB ID

b) Strong static emitted from the CB may cause the ADF needle to deflect towards the CB

c) The static emitted from the CB during daytime will fade soon after you have passed it

d) All 3 answers are correct

6. An aircraft is flying on heading 330◦ and relative bearing to an NDB is 190◦. Calculate QDR:

1. a) 360◦
2. b) 160◦
3. **c) 340◦**
4. d) 140◦

7. An aircraft is flying on heading 300◦, variation in the area 13◦W and the realative bearing is 350◦. Calculate QDM:

1. a) 110◦
2. **b) 290**◦
3. c) 300◦
4. d) 150◦

8. The bearings from NDB’s are least accurate at:

1. a) Midnight
2. b) Midday
3. **c) Dawn and Dusk**
4. d) The accuracy does not change during night or day

9. Fading of an ADF signal, together with a hunting needle, is indication of:

1. a) Quadrantal effect
2. b) Thunderstorm effect
3. **c) Night effect**
4. d) Mountain effect

VOR AND DOPPLER VOR

DVOR

1. The antenna polar diagram of a conventional VOR:

1. a) Is always directed toward the aircraft
2. b) Is like a figure of 8
3. c) Is a pencil beam
4. **d) Rotates at 30 revolutions per second**

2. The TO/FROM indicator of a VOR:

a) Tells whether you are now flying towards or from the VOR

b) Tells whether a track equal to the selected bearing will bring you to or away from the VOR

c) Tells whether the deviation indicator shows that you should manoeuvre the aircraft towards or from the CDI needle

d) Tells whether you should turn the aircraft towards or away from the CDI indication

3. In order to establish what radial you are on, you could:

a) Read the OBS when the CDI is centred and the TO/FROM is showing TO

b) Rotate the OBS until the CDI is centred and the TO/FROM indicator is showing FROM. Then read the radial on the OBS

c) Turn the OBS to make the TO/FROM change from TO to FROM. The OBS is now indicating the radial you are on

d) Turn the aircraft until the CDI is centred. The aircraft magnetic heading is now the reciprocal of the radial you are on

4. The height of a VOR above MSL is HT(VOR) feet, and the aircraft is flying at true altitude HT(a/c) feet. Which equation will show maximum range in NM of reception

of this VOR?

a) Max. range = 1.25 times square root of HT(a/c) + 1.25 times square root of HT(VOR)

b) Max. range = 1.25 times square root of HT(a/c) + 1.25 times of HT(VOR)

c) Max. range = 1.25 times square root of HT(a/c) – 1.25 times square root of HT(VOR)

d) Max. range = 1.25 times square root of HT(a/c) – 1.25 times of HT(VOR)

5. What degrades the accuracy of a VOR?

1. a) Static interference
2. **b) Propagation errors due to uneven terrain**
3. c) Night effect
4. d) Coastal effect

6. In a conventional VOR (CVOR), which element of the transmission uses amplitude modulation and which uses frequency modulation?

1. a) The variable-phase and bearing use AM. The ATIS information is FM
2. **b) The variable-phase is AM. The reference is FM**
3. c) The reference and ATIS is AM. The variable-phase is FM
4. d) The reference is AM. The variable-phase is FM

7. An aircraft is required to approach a VOR station via the radial 340. Which of the following indications should be seen on the VOR/ILS deviation indicator, and what is the position of the TO/FROM indicator?

1. a) 340◦ with the TO flag showing
2. b) 340◦ with the FROM flag showing
3. **c) 160◦ with the TO flag showing**
4. d) 160◦ with the FROM flag showing

8. If using VOR bearing information beyond the published protection range, errors could be caused by:

1. a) Interference from thunderstorms
2. b) Coastal refraction
3. c) Night effect
4. **d) Interference from other transmitters**

DISTANCE MEASURING EQUIPMENT

1. In the DME system:

1. a) The aircraft equipment is called a transponder
2. **b) The receive and transmit frequency is always split by 63 MHz**

3. c) The operation is similar to a primary radar system

4. d) The channels are referred to as “X” channels paired with VOR’s and “Y” channels paired with ILS localisers

2. The airborne DME equipment will transmit pulse pairs at a comparatively high PRF:

1. a) At all times, except when the panel control “LO” is operated

2. b) When the distance presented is above 50 NM

3. c) Whenever a stable signal is being received from the selected ground station

4. **d) When first switched on and after a channel selection**

3. System, or beacon, saturation of the DME system:

a) Occurs when the aircraft DME set has been in operation for an extended period of time, without being put into the STAND/BY mode

b) Occurs when many aircraft, being at along distance from the DME, are demanding a reply

c) May occur when more than 100 aircraft are demanding replies from a single ground station

d) All 3 answers are correct

4. If a VOR station and a DME station, having different locations, are selected to provide a fix:

1. a) Two sets, with separate frequency control, are required in the aircraft

2. b) Two positions, being ambiguous, will be presented

3. c) Two different IDs will have to be checked

4. **d) All 3 answers are correct**

5. Using modern DME equipment meant for general navigation use, the accuracy expected is:

1. a) ± 2 NM

2. b) ± 5 NM or 0.25% of the slant range, whichever is greater

3. **c) ± 2 NM + 0.25% of the slant range, whichever is greater**

4. d) ± 2 NM + 3.0% of the slant range

6. How many aircraft will saturate a DME station?

1. a) 200 aircraft

2. **b) 100 aircraft**

3. c) 50 aircraft

4. d) 2700 aircraft

7. A DME transceiver does not lock on to its own reflections because:

1. a) The PRF of the pulse pairs is jittered

2. b) It used MTI

3. **c) The interrogation and reply frequencies differ**

4. d) The reflections will all fall within the flyback period

8. An aircraft is passing overhead a DME station at FL 240. What is the DME indication?

1. a) 0 DME
2. b) 1 DME
3. **c) 4 DME**
4. d) 6 DME

INSTRUMENT LANDING SYSTEM

1. Consider the following statements on ILS:

a) An ILS approach may be flown if the localizer, glide path and marker beacons/DME are operational

b) If the localizer is out of service, an ILS approach with increased decision height (DH) may be carried out

c) ILS is the primary precision approach facility for civil aviation

d) When the pilot is reaching the decision height (DH) he may only continue the approach if both localizer and glide path indications are within one dot from the centre positions

2. Which of the following frequencies does ILS use?

a) 112.10 MHz

b) 111.20 MHz

c) 108.45 MHz

d) 109.35 MHz

3. The ILS glidepath transmitter is located:

a) No more than 600 m from the localizer transmitter

b) About 150 m upwind from the threshold and about 300 m from the centre line of the runway

c) About 300 m upwind from the threshold and about 150 m from the centre line of the runway

d) As close to the runway threshold as possible without causing an obstruction to aircraft

4. The glidepath transmitter operates on:

1. a) 36 VHF frequencies, paired with localizer frequencies
2. b) The frequencies 90 and 150 MHz
3. c) On frequencies found by multiplying the localizer frequency by 2
4. **d) 40 frequencies from 329.15 MHz to 335.00 MHz**

5. If the ILS monitoring equipment senses a shift or changes outside set limits in the basic transmission:

1. a) The Tower Control will inform any inbound aircraft about the inaccuracy

2. b) The technicians on duty will switch on the stand/by ILS equipment
3. c) The pilot on ILS approach will be notified by the identification signal disappearing
4. **d) The transmissions on a Cat I ILS will be stopped within 6 seconds**

6. The middle marker is identified by:

1. **a) Audible alternate dots and dashes with tone 1300 Hz and an amber light**
2. b) Audible alternate dots and dashes with tone 800 Hz and an amber light
3. c) Audible alternate dots and dashes with tone 800 Hz and a white light
4. d) Audible alternate dots and dashes with tone 1300 Hz and a white light

7. What is the width of the localizer from full fly left through centre to full fly right on the cockpit localizer indicator?

1. a) 10◦
2. b) 20◦
3. **c) 5**◦
4. d) 2.5◦

8. When flying outside the ILS published coverage area, you may expect:

1. **a) Incorrect/false signals**
2. b) Correct signals

3. c) Always fly up signal
4. d) Always fly down signal

MICROWAVE LANDING SYSTEM AND RADAR PRINCIPLES

1. In a primary radar system:

a) The aircraft plays the secondary role, just listening to the radar signals from the ground radar

b) All radio frequency energy is produced by the radar located at the radar site

c) The radar is primarily used for range finding

d) The radar is the primary aid for ATC

2. What governs the theoretical maximum range of primary radar?

1. a) Frequency
2. b) Wavelength
3. **c) Pulse repetition frequency**
4. d) Pulse width

3. Primary radar operates on the principle of:

1. a) Medium wave technique
2. **b) Pulse technique**

3. c) Doppler technique
4. d) None of the above

4. When dealing with radar the term PRF is used, PRF is measured in which unit?

1. a) Number of pulses per minute
2. b) Number of oscillations per second
3. **c) Number of pulses per second**
4. d) Number of oscillations per minute

5. Consider the following statements on primary radar:

a) Precipitation will reduce the range of radars operating on low frequencies to larger extent than radars operating on higher frequencies

b) Target shape and size has little influence on the radar maximum range

c) Temperature inversions may increase the maximum detection range

d) The most common radar indicator is called an "A" scope

6. In order to achieve narrow beam width with a radar antenna of a set size:

a) The carrier frequency must be low

b) The PRF must be high

c) The pulse length must be kept short

d) The wave-length must be short

1. In a radar set the purpose of the TR switch is:

1. a) To change the whole set from receive mode to transmit mode
2. **b) To protect the receiver while the pulse is transmitted**
3. c) To set the time reference of the indicator
4. d) To secure that the Time of Return is registered

8. A radar system has a PRF that is 1200. Calculate the maximum unambiguous range:

1. a) 125 NM
2. b) 135 NM
3. **c) 68 NM**
4. d) 250 NM

9. Long range surveillance radar may typically use a frequency of :

1. **a) 1000 MHz**
2. b) 600 MHz
3. c) 3000 MHz
4. d) 10 GHz

10. Why does the aircraft transponder system not respond to its own transmissions when reflected from the ground?

a) Different frequencies are used 60 MHz apart

b) Pulse repetition frequency changed

c) The transponder system does not reply to its own reflected signals, but these responses are rejected by the transponder system at the site

d) The aircraft signal is not reflected

11. Which combination of characteristics gives the best resolution in a primary search radar?

1. a) Long pulse length and wide beam
2. b) Short pulse and wide beam
3. c) Long pulse and narrow beam
4. **d) Short pulse length and narrow beam**

12. The purpose of a radio transmitter is:

a) To produce a carrier wave with a constantly changing frequency

b) To produce a radio frequency electric current and deliver this energy to the antenna

c) To produce a carrier wave to the audio frequency output of the transmitter

d) All three answers are correct

GLOBAL NAVIGATION SATELLITE SYSTEMS

1. The most favoured type of GPS receiver for use in civil transport aircraft is:

1. a) The Five Satellite Receiver
2. **b) The Multi Channel**
3. c) The Multi Satellite Receiver
4. d) The Universal Receiver

2. One task of the control segment of the satellite navigation system NAVSTAR/GPS is to:

a) Monitor the status of the satellites

b) Manufacture and launch satellites

c) Manipulate the signals of the selected satellites to reduce the precision of the position fix (Selective availability SA)

d) Grant and monitor user authorisations

3. The clock in the GPS receiver is corrected to the GPS time system:

a) By synchronizing it with the time signal sent by the Master satellite

b) By mathematically adjusting the lines of position from four satellites to a perfect fix

c) Using the average of the time signal received from at least 3 satellites

d) Automatically as soon as signals from 1 satellite is received

4. The GPS satellites will complete an orbit in approximately:

1. a) 6 hours
2. **b) 12 hours**
3. c) 24 hours
4. d) 21 hours

5. GPS system satellites transmit their signals on two carrier waves 1575 MHz and 1227 MHz and supply two possible codes accessible according to user (civil or military). Commercial aviation uses:

1. a) Only the 1575 MHz carrier wave and two codes
2. b) Only the 1227 MHz carrier wave and one code
3. c) The two carrier waves and one public code
4. **d) Only the 1575 MHz carrier wave and one code**

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

1. a) Is negligible small because of the great accuracy of the atomic clocks in the satellites
2. b) Is the biggest part of the total error and cannot be corrected
3. c) Can be minimized by synchronizing the satellite clock with the receiver clock
4. **d) Is corrected by using signals from four satellites**

7. Differential GPS is a system that allows the GPS receiver to correct known errors in the position calculations. Which errors are corrected?

1. a) Receiver clock error and receiver noise
2. **b) Receiver noise**
3. **c) Receiver clock error, ephemeris satellite clock and ionosphere delay**
4. d) Ephemeris

AIRBORNE WEATHER RADAR

1. How many degrees will an AWR be pitched to establish whether a cloud is level with the aircraft, assuming a 5◦ beamwidth?

2. **a) + 2.5◦**
3. b) – 2.5◦
4. c) 0◦
5. d) 5◦

2. What are the advantages of using a slotted waveguide antenna in AWR?

1. a) More side lobes and concentrates the power in sharper beams
2. b) Less side lobes but the beams tend to be wider
3. c) More side lobes but the power is concentrated in sharper beams
4. **d) Less side lobes and concentrates power in sharper beams**

3. In AWR that has a colour cathode ray tube, the areas of greatest turbulence are indicated on the screen by:

1. a) Iso-echo areas which are coloured black
2. **b) Iso-echo areas which are coloured magenta**
3. c) Blank Iso-echo areas where there is no colour
4. d) Large flashes of flashing red colour

4. The purpose of the contour circuit on a monochrome airborne weather radar is to:

a) Indicate severe areas of CAT

b) Show areas with heavy precipitation as dark areas on the display surrounded by bright returns

c) Disable the receiver swept gain function in order to achieve maximum amplification

d) Enable the radar to be used for terrain clearance

5. A frequency of AWR is:

1. **a) 9375 MHz**
2. b) 9375 kHz
3. c) 9375 GHz
4. d) 93.75 MHz

6. The main task of an AWR is:

1. **a) To detect areas of potentially severe turbulence ahead of the aircraft**

2. b) To detect and present a radar picture of clouds with precipitation ahead of the aircraft

3. c) To detect areas with strong winds ahead of the aircraft

4. d) To detect and relay to meteorological offices information on the weather in the area ahead of the aircraft

FMS