EAST AFRICAN SCHOOL OF AVIATION EXAMINATION

SAFETY SECTION

DIPLOMA IN FLIGHT DISPATCH

EWAC NO.05

FINAL EXAMINATION

SUBJECT: GENERAL NAVIGATION

Duration: 02 hrs.

DAY/DATE: TIME: 0830HRS – 1030HRS

1. What is the approximate compression of the Earth?
   a. 3%
   b. 0.3%
   c. 0.03%
   d. 1/3000
2. A Graticule is the name given to:
   a. a series of lines drawn on a chart
   b. a series of Latitude and Longitude lines drawn on a chart or map
   c. a selection of small circles as you get nearer to either pole
   d. reduced earth
3. What is the shortest distance between (D) Durban (2930S 03030E) and (E) Leningrad (5947N 03030E)?
   a. 5357NM
   b. 7000NM
   c. 5357KM
   d. 7000NM

4. What is the shortest distance between (J) Tokyo (3557N 13535E) and (K) Rio de Janeiro (2210S 04425W)?
    a. 10073nm
    b. 9973nm
    c. 11627nm
    d. 9860nm
5. Aclinic Lines is the name given to isoclinals joining places of zero dip.
    a. True
    b. False
6. 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. d. cannot exceed 90°
7. The angle between True North and Magnetic North is known as:
    a. deviation
    b. variation
    c. alignment error
    d. dip
8. 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
9. Given the following: True track: 192° Magnetic variation: 7°E Drift angle: 5° left What is the magnetic heading required to maintain the given track?
    a. 190°
    b. 194°
    c. 204°
    d. 180°
10. Given the following: Magnetic heading: 060° Magnetic variation: 8°W Drift angle: 4° right What is the true track?
    a. 064°
    b. 048°
    c. 072°
    d. 056°
11. European regulations (CS Ops-1) state that the maximum permissible deviations after compensation for the DRC are:
    a. ten degrees
    b. three degrees
    c. one degree
    d. two degrees

12. Deviation due to coefficient A is mainly caused by:
    a. hard iron force acting along the longitudinal axis.
    b. hard and soft iron forces acting along the lateral axis.
    c. vertical soft iron forces.
    d. a misaligned lubber line.
13. 265 US-GAL equals? (Specific gravity 0.80)
    a. 803 kg
    b. 862 kg
    c. 940 kg
    d. 895 kg
14. What is the ratio between the litre and the US-GAL ?
    a. 1 US-GAL equals 3.78 litres
    b. 1 litre equals 3.78 US-GAL
    c. 1 US-GAL equals 4.55 litres
    d. 1 litre equals 4.55 US-GAL
15. Fuel flow per HR is 22 US-GAL, total fuel on board is 83 IMP GAL. What is the endurance?
    a. 3 HR 12 MIN
    b. 3 HR 53 MIN
    c. 4 HR 32 MIN
    d. 2 HR 15 MIN
16. Flight Level 350, COAT = -47°C, CAS = 280 knots. What is TAS?
    a. 500
    b. 380
    c. 280
    d. 480
17. Indicated Altitude is 20000 feet. SAT is -35°C. What is True Altitude?
    a. 19200
    b. 21800
    c. 18200
    d. 20000
18. Given: Pressure Altitude 29000 FT, OAT -55°C. Calculate the Density Altitude?
    a. 31000 FT
    b. 27500 FT
    c. 26000 FT
    d. 31000 FT
19. Given: TAS = 270 kt, True HDG = 270°, Actual wind 205°(T)/30kt, Calculate the drift angle and GS?
    a. 6R - 259kt
    b. 6L - 256kt
    c. 6R - 251kt
    d. 8R - 259k

20. Given: TAS = 370 kt, True HDG = 181°, W/V = 095°(T)/35kt. Calculate the true track and GS?
    a. 176 - 370 kt
    b. 192 - 370 kt
    c. 189 - 370 kt
    d. 186 - 370 kt
21. Given: TAS = 198 kt, HDG (°T) = 180, W/V = 359/25. Calculate the Track(°T) and GS?
    a. 180 - 223 kt
    b. 179 - 220 kt
    c. 181 - 180 kt
    d. 180 - 183 kt
22. Given: TAS = 155 kt, Track (T) = 305°, W/V = 160/18kt. Calculate the HDG (°T) and GS?
    a. 301 - 169 kt
    b. 305 - 169 kt
    c. 309 - 170 kt
    d. 309 - 141 kt
23. Given: True HDG = 307°, TAS = 230 kt, Track (T) = 313°, GS = 210 kt. Calculate the W/V?
    a. 260/30kt
    b. 257/35kt
    c. 255/25kt
    d. 265/30kt
24. You are flying from A to B. You find that your position is 60 NM outbound from A and 7 NM left of the required track. What is your track error angle?
    a. 7° R
    b. 14° L
    c. 14° R
    d. 7° L
25. You are flying from G to H. You find that your position is 30 NM outbound from G and 4 NM left of the required track. What is your track error angle?
    a. 16° L
    b. 10° L
    c. 8° L
    d. 12° L
26. Track Error is Distance off divided by distance gone;
    a. True
    b. False
27. What approximate rate of descent is required in order to maintain a 3° glide path at a groundspeed of 120 kt?
    a. 550 FT/MIN
    b. 800 FT/MIN
    c. 950 FT/MIN
    d. 600 FT/MIN

28. ILS glide path 3 ° TAS 150 kt, headwind component 15 kt. What is the approximate rate of descent?
    a. 400 ft /min
    b. 675 ft /min
    c. 975 ft /min
    d. 1005 ft/ min
29. Given that: A is N55° E/W000° B is N54° E010°, if the initial true great circle track from A to B is 100°(T), what is the true rhumb line track at A?
    a. 096°(T)
    b. 107°(T)
    c. 104°(T)
    d. 100°(T)
30. The reported surface wind from the Control Tower is 240°/35 kt. Runway 30 (300°). What is the cross-wind component?
    a. 30 kt
    b. 24 kt
    c. 27 kt
    d. 21 kt
31. The great circle track from A (20°00'N 010°00'W) to B (40°00'N 010°00'E) is 060° (T). The great circle track from B to A is:
    a. 240° (T)
    b. 245° (T)
    c. 250° (T)
    d. 230° (T)
32. The angle between the true great-circle track and the true rhumb-line track joining the following points: A (60° S 165° W) B (60° S 177° E), at the place of departure A, is:
    a. 7.8°
    b. 9°
    c. 15.6°
    d. 5.2°
33. Which of these 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 d.long * Sine Lat.
    d. Its value at the Equator is d.long converted to minutes of arc
34. What is departure ?
    a. Distance between meridians , cosine latitude times sixty (cos lat *60)
    b. Distance between latitudes cosine meridian times sixty (cos mer*60)
    c. Distance between meridians sine latitude times sixty(sine lat *60)
    d. Distance between the Equator and the latitude (60 * cosine latitude)

35. The 'departure' between positions 60°N 160°E and 60°N 'x' is 900 NM. What is the longitude of 'x'?
    a. 170°W
    b. 140°W
    c. 145°E
    d. 175°E
36. An aircraft at latitude 02°20'N tracks 180°(T) for 685 km. On completion of the flight the latitude will be:
    a. 04°10'S
    b. 04°30'S
    c. 09°05'S
    d. 03°50'S
37. A straight line drawn on a chart measures 4.63 cm and represents 150 NM. The chart scale is:
    a. 1: 6 000 000
    b. 1: 3 000 000
    c. 1: 5 000 000
    d. 1: 1 000 000
38. Chart A has a scale of 1:250,000. Chart B has a scale of 1:500,000. Which of these statements is correct?
    a. Chart A has a larger scale because earth distance is larger.
    b. Chart B has a larger scale because earth distance is larger.
    c. Chart A has a larger scale because earth distance is smaller.
    d. Chart B has a larger scale because earth distance is smaller
39. A chart has the scale 1: 1 000 000. From A to B on the chart measures 1.5 inches (one inch equals 2.54 centimetres), the distance from A to B in NM is:
    a. 20.6
    b. 38.1
    c. 44.5
    d. 54.2
40. The chart that is generally used for navigation in polar areas is based on a:
    a. Stereographical projection
    b. Direct Mercator projection
    c. Gnomonic projection
    d. Lambert conformal projection
41. A Mercator chart has a scale at the equator = 1: 3 704 000. What is the scale at latitude 60° S?
    a. 1: 7 408 000
    b. 1: 3 208 000
    c. 1: 185 200
    d. 1: 1 852 000
42. The nominal scale of a Lambert conformal conic chart is the:
    a. scale at the standard parallels
    b. mean scale between pole and equator
    c. mean scale between the parallels of the secant cone
    d. scale at the equator

43. On a Lambert Conformal Conic chart earth convergency is most accurately represented at the:
    a. parallel of origin
    b. north and south limits of the chart
    c. standard parallels
    d. Equator
44. In the topographical charts used for Navigation which one would you expect to have the scale expanding away from the Equator ?
    a. Mercator projection
    b. Lambert conformal conic projection
    c. Transverse Mercator projection
    d. All the options.
45. A Rhumb line is:
    a. a line on the surface of the earth cutting all meridians at the same angle
    b. the shortest distance between two points on a Polyconic projection
    c. any straight line on a Lambert projection
    d. a line convex to the nearest pole on a Mercator projection
46. A straight line on a Lambert Conformal Projection chart for normal flight planning purposes:
    a. is a Loxodromic line
    b. is a Rhumb line
    c. is approximately a Great Circle
    d. can only be a parallel of latitude
47. What is the meaning of the term "standard time" ?
    a. It is the time zone system applicable only in the USA
    b. It is an expression for local mean time
    c. It is another term for UTC
    d. It is the time set by the legal authorities for a country or part of a country
48. What is the local mean time, position 65°25'N 123°45'W at 2200 UTC?
    a. 1345
    b. 2200
    c. 0615
    d. 0815
49. The Local Mean Time at longitude 095°20'W, at 0000 UTC, is:
    a. 1738:40 previous day
    b. 0621:20 previous day
    c. 1738:40 same day
    d. 0621:20 same day
50. The ICAO definition of ETA is the:
    a. actual time of arrival at a point or fix
    b. estimated time of ar
    c. rival at an en-route point or fix
    d. estimated time en route
    e. estimated time of arrival at destination

51. According to Kepler_s law, the Earth is closest to the sun during
    a. Perihelion
    b. Aphelion
    c. Solstice
    d. Equinox
52. At what approximate date is the earth furthest from the sun (aphelion)?
    a. End of December
    b. Beginning of January
    c. End of September
    d. Beginning of July
53. What is the time required to travel along the parallel of latitude 60° N between meridians 010° E and 030° W at a groundspeed of 480 kt?
    a. 1 HR 15 MIN
    b. 1 HR 45 MIN
    c. 5 HR 00 MIN
    d. 2 HR 30 MIN
54. At what approximate date is the earth closest to the sun (perihelion)?
    a. Beginning of January
    b. End of March
    c. Beginning of July
    d. End of June
55. A flight is to be made from 'A' 49°S 180°E/W to 'B' 58°S, 180°E/W. The distance in kilometres from 'A' to 'B' is approximately:
    a. 1222
    b. 540
    c. 804
    d. 1000
56. Given: Distance A to B = 120 NM, After 30 NM aircraft is 3 NM to the left of course. What heading alteration should be made in order to arrive at point 'B'?
    a. 8° right
    b. 6° right
    c. 4° right
    d. 8° left
57. The circumference of the parallel of latitude at 60°N is approximately:
    a. 18 706 NM
    b. 20 000 NM
    c. 34 641 NM
    d. 10 800 NM
58. Seasons are due to the:
    A. Earth's elliptical orbit around the Sun
    B. inclination of the polar axis with the ecliptic plane
    C. Earth's rotation on its polar axis
    D. variable distance between Earth and Sun

59. A direct Mercator graticule is based on a projection that is:
    a. cylindrical
    b. conical
    c. spherical
    d. concentric
60. At a specific location, the value of magnetic variation:
    a. varies slowly over time
    b. depends on the type of compass installed
    c. depends on the magnetic heading
    d. depends on the true heading

SECTION B

1. Outline the 2 laws of Kepler (4 marks)
2. List 5 characteristics of a great circle (10 marks)
3. Give the difference between a sidereal day and an apparent solar day (6 marks)