

**SECTION A (30 MARKS)**

1. The angle between the true great-circle track and the true rhumb-line track joining the following points: A ( $60^{\circ}$  S  $165^{\circ}$  W) B ( $60^{\circ}$  S  $177^{\circ}$  E), at the place of departure A, is:
  - A.  $5.2^{\circ}$
  - B.  $7.8^{\circ}$
  - C.  $15.6^{\circ}$
  - D.  $9^{\circ}$
2. A great circle on the Earth running from the North Pole to the South Pole is called:
  - A. a meridian.
  - B. a parallel of latitude.
  - C. a longitude.
  - D. a difference of longitude
3. Taking the circumference of the earth as 21600 NM at the Equator, what is the distance between two longitudes one degree apart at  $45^{\circ}$  N or S of the Equator ?
  - A. 2700 NM
  - B. 30 NM
  - C. 42 NM
  - D. 60 NM
4. The scale of a chart is 1: 750,000 at the Equator. The Chart length to the nearest inch between meridians  $7^{\circ}$  apart at the equator is :
  - A. 22
  - B. 63
  - C. 41
  - D. 6
5. What is the chart distance between longitudes  $179^{\circ}$ E and  $175^{\circ}$ W on a direct Mercator chart with a scale of 1: 5 000 000 at the equator?
  - A. 106 mm
  - B. 133 mm
  - C. 167 mm
  - D. 72 mm
6. A Lambert conformal conic projection, with two standard parallels:
  - A. shows all great circles as straight lines

- B. the scale is only correct at parallel of origin
  - C. the scale is only correct along the standard parallels
  - D. shows lines of longitude as parallel straight lines
7. Given: Distance 'Q' to 'R' 1760 NM
- Groundspeed 'out' 435 kt
  - Ground speed 'back' 385 kt
  - Safe endurance 9HR
- The distance from 'Q' to the Point of Safe Return (PSR) between 'Q' and 'R' is:
- 1. 1642 NM
  - 2. 1313 NM
  - 3. 1838 NM
  - 4. 1467 NM
8. What is the "Q" code for a magnetic bearing from a VDF station?
- A. "Request QDM".
  - B. "Request QNH".
  - C. "Request QDR".
  - D. "Request QTE".
9. An aircraft is planned to fly from position 'A' to position 'B', distance 250 NM at an average GS of 115 kt. It departs 'A' at 0900 UTC. After flying 75 NM along track from 'A', the aircraft is 1.5 MIN behind planned time. Using the actual GS experienced, what is the revised ETA at 'B'?
- A. 1044 UTC
  - B. 1110 UTC
  - C. 1050 UTC
  - D. 1115 UTC
10. At what approximate date is the earth furthest from the sun (aphelion)?
- A. Beginning of July
  - B. Beginning of January
  - C. End of December
  - D. End of September

11. The diameter of the Earth is approximately:
- A. 18 500 km
  - B. 12 700 km
  - C. 6 350 km
  - D. 40 000 km
12. How does the convergency of any two meridians on the Earth change with varying latitude?
- A. It changes as sine of latitude.
  - B. It increases with decrease of latitude.
  - C. It is of constant value and does not change with latitude.
  - D. It changes as cosine of latitude.
13. If you are flying along a parallel of latitude, you are flying:
- A. a rhumb line track.
  - B. on circle track.
  - C. on a track which is constantly changing direction.
  - D. a great north - south track.
14. On a Mercator chart, a great circle is represented as a:
- A. Curve concave to the meridians.
  - B. Curve concave to the Equator.
  - C. Curve concave to the nearer pole.
  - D. Straight line.
15. An aircraft flies from position A ( $54^{\circ} 00' N$   $035^{\circ} 10' E$ ) to position B ( $24^{\circ} 20' N$   $010^{\circ} 00' E$ ).
- Find the change in longitude.
- A.  $25.2^{\circ} W$
  - B.  $25.2^{\circ} E$
  - C.  $10^{\circ} E$
  - D.  $10^{\circ} W$

**SECTION B. (40 MARKS)**

1. A straight line drawn on a chart measures 4.63 cm and represents 150 NM. The chart scale is: ( 2 marks)
2. A Lambert conformal conic chart has a constant of the cone of 0.80.  
A straight line course drawn on this chart from A (53°N 004°W) to B is 080° at A;  
Course at B is 092° (T). What is the longitude of B? ( 3 marks)
3. An aircraft travels 2.4 statute miles in 47 seconds.  
What is its groundspeed in nautical miles? ( 2 marks)
4. A nautical mile is how many meters? ( 1 mark)
5. The formula for Earth Conversion Angle is ( 1 mark)
6. An aircraft at latitude 10° South flies north at a GS of 890 km/Hr. What will its latitude be after 1.5 HR? ( 3 marks)
7. On a Direct Mercator chart at latitude 15°S, a certain length represents a distance of 120 NM on the earth. The same length on the chart will represent on the earth, at latitude 10°N, a distance of ? ( 3 marks)
8. An aircraft travels 100 statute miles in 20 MIN, how long does it take to travel 215 NM? ( 1 marks)
9. On the 27th of February, at 52°S and 040°E, the sunrise is at 0243 UTC. On the same day, at 52°S and 035°W, the sunrise is at: ( 2 marks)
10. An aircraft flies a great circle track from 56° N 070° W to 62° N 110° E. The total distance travelled is? ( 2 marks)
11. The standard parallels of a Lambert's conical orthomorphic projection are 07°40'N and 38°20' N. The constant of the cone for this chart is ( 2 marks)
12. An aircraft is flying from point X to Y and the distance between is shown on a map to be 32 inches apart on a chart with a scale 1 :530,000. The flight time of the aircraft between the two points is 52 minutes . Find the ground speed of the aircraft. ( 3 marks)
13. Given a compass heading of 080°C, a compass deviation of 4°E, where the local magnetic Variation is 5°W, what is the true heading ? ( 2 marks)
14. The earth is flattened slightly at the poles and its shape is described as..... ( 1 mark)
15. A climb is from 1000 ft to 17,000 ft. The mean altitude is? ( 1 mark)
16. Define a small circle ( 1 mark)
17. Identify the following symbols. ( 2 marks)

- i. Chart one number 1 and 4
- ii. Chart two numbers 6 and 12

18. An aircraft departs A ( $169^{\circ} 47'W$ ) at 19:19:00 LMT on 23<sup>rd</sup> June. The destination is B at ( $173^{\circ}58'E$ ), the flying time is 7:27:00. Determine the ETA at B in LMT. (3 marks)
19. An aircraft at position 2700N 17000W travels 3000 km on a track of  $180^{\circ}(T)$ , then 3000 km on a track of  $090^{\circ}(T)$ , then 3000 km on a track of  $000^{\circ}(T)$ , then 3000 km on a track of  $270^{\circ}(T)$ . What is its final position? ( 3 marks)
20. An aircraft and an NDB are in the Northern Hemisphere. The aircraft's heading is  $236^{\circ}M$ . variation is  $13^{\circ}W$  at the aircraft and  $11^{\circ}W$  at the NDB. The relative bearing (RBI) of the NDB is  $226^{\circ}(R)$ . Convergency between the aircraft's meridian and the meridian of the NDB is  $4^{\circ}$ . What bearing should be plotted from the NDB on a Mercator chart? (2 marks)

# Chart 1

## ICAO AERONAUTICAL CHART SYMBOLOGY

### RADIO NAVIGATION AIDS

1



2



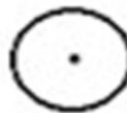
3



4



5



6



7



# Chart 2

## ICAO AERONAUTICAL CHART SYMBOLOGY

### AIR TRAFFIC SERVICES

1. 

5. 

2. 

6. 

3. 

7. 


4. 


8. 

### OBSTACLES


9. 

12. 

10. 

13. 

11. 

14. 

### VISUAL AIDS

15. 

16. 