

Indian Maritime University
(A Central University, Govt of India)

Sep/Oct'25 SE

Programme Name: B Sc Nautical Science

Semester: 2

Subject Code: UG21T6205

Subject Name: TERRESTRIAL NAVIGATION

Date: 12.09.2025

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

General Instructions

- 1) Both Parts (A & B) are to be attempted.
- 2) Meridional Tables can be used.
- 3) Tidal sheets to be used.
- 4) Traverse Tables allowed.
- 5) Scientific calculators allowed.

Section - A

Answer all questions, Choose the correct answer as applicable
(10x1mark=10marks)

1. Magnetic Variation in 2024: $3^{\circ}15'$ W. Annual Change: $8'E$ per year. Variation in 2027?
 - a) $2^{\circ}15'$ W
 - b) $3^{\circ}39'$ W
 - c) $2^{\circ}51'$ W
 - d) $2^{\circ}15'$ E
2. Compass Co. 124° , Var: $2^{\circ}E$, Dev.: $12^{\circ}W$, then True course?
 - a) 138°
 - b) 114°
 - c) 134°
 - d) 110°
3. d'long from Initial long $179^{\circ}W$ to Final long $178^{\circ}E$
 - a) $357^{\circ}E$
 - b) $357^{\circ}W$
 - c) $3^{\circ}W$
 - d) $3^{\circ}E$
4. Rhumbline course are i) _____ on a Gnomonic Chart & ii) _____ on a Mercator chart.
 - a) i) curved ii) curved
 - b) i) curved ii) straight



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- c) i) straight ii) curved
d) i) straight ii) straight
5. The Mercator chart inherently has i) _____ distortion, to compensate which ii) _____ distortion is deliberately introduced.
- a) i) East-West ii) East-West
b) i) North-South ii) North-South
c) i) North-South ii) East-West
d) i) East-West ii) North-South
6. The spherical triangle is formed with one side being the i) _____ track, and the other two sides being the ii) _____ through the two points.
- a) i) Rhumb line ii) parallels of latitude
b) i) Great circle ii) parallels of latitude
c) i) Great circle ii) meridians
d) i) Great circle ii) Rhumb line
7. While drawing a spherical triangle, if one of the positions was in the north and the other in the south, the pole is drawn towards _____.
- a) the longitude which has a higher value
b) the latitude which has a higher value
c) North
d) the side which has a greater distance from its pole
8. Scale of a nautical chart is the ratio of the:
- a) depth of water to the height of land
b) distance on the chart to the actual distance on Earth
c) size of the ship to the area being navigated
d) latitude to longitude at a given location
9. Which statement is correct regarding chart scales?
- a) A small-scale chart covers a large area with less detail.
b) A large-scale chart covers a large area with more detail.
c) A harbor chart is an example of a small-scale chart.
d) A small-scale chart is primarily used for detailed navigation in harbors.
10. When the sun and the moon in conjunction cause _____ tides.
- a) spring
b) high
c) neap
d) no

Section - B

Answer all five questions (5 x 2marks = 10 marks)

11. What is Earth's compression? (2 Marks)

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12. In lat 40°S , if 1° of lat on a Mercator chart measures 12 cm, find the length of 1° of long. (2 Marks)
13. Describe Vertex of a GC track, and its uses. (2 Marks)
14. Describe Chart Datum. (2 Marks)
15. Enlist four differences between Raster Chart and Vector Chart. (2 Marks)

Section - C

Answer al five question (5x10marks = 50 marks)

16. a. Derive the Parallel Sailing formula. (5 marks)
- b. A vessel left position $34^{\circ} 18' \text{N } 178^{\circ} 08' \text{ E}$ steered a course of 120° T for a distance of 340 nm. Calculate the arrived position. (5 marks)
17. a. Find, by Mercator sailing, the course and distance:
from initial position $12^{\circ}09' \text{N } 009^{\circ}12' \text{W}$ to final position $20^{\circ}57' \text{S } 002^{\circ}18' \text{E}$ (5 marks)
- b. Find the final position from:
Initial Position $36^{\circ}48' \text{N } 085^{\circ}53' \text{W}$ Co. 241°T Dist 1897M (5 marks)
18. For the following Great Circle Track, calculate the:
- initial course, final course and GC distance
Posn X: $39^{\circ}00' \text{S } 020^{\circ}00' \text{W}$ to Posn Y: $40^{\circ}00' \text{S } 142^{\circ}00' \text{E}$ (10 marks)
19. a. Describe Sector lights. (5 marks)
- b. In the 32-pt compass, enlist the points clockwise from N to E (5 marks)



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20. Standard Tides: Find the depth of water on March 2nd at 1430 hrs at a position off Singapore, where charted depth is 4m. (10 marks)

EXTRACT FROM THE ATT	
ZONE TIME: - 0800 HRS	
TIME	HEIGHT
0014	2.7m
0603	0.8m
1209	2.9m
1830	0.6m

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