
Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – December 2025
Programme Name: B Sc (NS)
Semester: III
Subject Code: UG21T6305
Subject Name: CELESTIAL NAVIGATION

Date: 15.12.2025

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

General Instructions

- (i) All Sections (A, B & C) are to be attempted.
- (ii) Non Programmable Scientific calculator is permitted.
- (iii) Norrie's Nautical tables and Nautical Almanac 2008 are permitted.

Section A

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1. Theoretical Sunrise is when
 - a) Sun's UL is in line with visible horizon
 - b) Sun's LL is in line with visible horizon
 - c) LL of Sun is one semidiameter above visible horizon
 - d) Centre of Sun is in line with visible horizon
 2. GHA of 1st point of Aires changes at the rate of
 - a) 15°/hr
 - b) 15.041°/hr.
 - c) 14.19°/hr
 - d) Doesn't change being fixed point at space.
 3. Plane of Observer's Rational Horizon would align with equinoctial plane when
 - a) Latitude of Observer is 00°
 - b) Observer is at the centre of Celestial sphere
 - c) Latitude of observer is 90°N only
 - d) Latitude of Observer is 90°N or S
 4. Condition of a celestial body to be circumpolar for an observer is
 - a) Lat.of Observer \geq Declination of the Celestial body
 - b) Lat.of Observer \geq Polar distance of the Celestial body
 - c) Lat.of Observer \leq Polar distance of the Celestial body
 - d) Lat.of Observer \leq Declination of the Celestial body
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5. Parallax in Altitudes depends up on
- a) Distance of the CB from the observer & Altitude of the CB
 - b) Distance from the CB only
 - c) Altitude of the CB only
 - d) Semi-diameter of the CB
6. Planet Venus Cannot be seen at midnight because
- a) GHA of SUN & VENUS is same at midnight
 - b) VENUS is in Opposition with the SUN at midnight
 - c) Max. Elongation of VENUS is approx. 3hrs.
 - d) Max. Elongation of Venus is approx. 47°
7. 'v' correction is to be applied with the
- a) SHA of Planets & Moon
 - b) GHA of Planets & Moon
 - c) Declination of Planets & Moon
 - d) Altitude of a CB
8. Daily orbital velocity of Earth is
- a) Fastest at Aphelion
 - b) Slowest at Perihelion
 - c) Is constant throughout the year
 - d) Fastest at Perihelion & Slowest at Aphelion
9. Observation of stars are made during
- a) Nautical Twilight
 - b) Astronomical Twilight
 - c) Civil Twilight
 - d) Anytime between rising & setting of star
10. To experience Annular Solar Eclipse Observer must be within
- a) Umbra Shadow
 - b) Penumbra Shadow
 - c) Divided Umbra shadow
 - d) Divided Penumbra shadow.

Section B Five Questions of 02 Marks each

11. Find the GP of SUN on 19th JAN.2008 @ 1030Hr. GMT
12. Find Sun Set time (IST) for an observer at Mumbai ($19^\circ 00' N$ $73^\circ 00' E$) on 29th NOV.2008
13. Explain Kepler's 2nd law of planetary motion.
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14. Identify the star No.53 in the month of Oct.2008 (name, constellation name, SHA& Decl., Stellar magnitude.)

15. Explain 12th time zone by a suitable diagram.

Section C

Answer all Five Questions (5 x 10marks = 50marks)

16. On 30th Nov 2008, at GMT 17h 32m 40 S, in DR 20° 30' N, 126° 42'W, the Sextant Alt of Sun's UL East of the meridian was 32° 18'.

HE 20m and IE 2' Off the arc. Calculate the direction of LOP and the Longitude where it cuts the DR latitude, also give a rough sketch to illustrate the same.

(10 Marks)

17. A) On 20th Jan 2008, GMT 22h 30m 45s in DR 50° 25'N 160° 00'E, the Azimuth of the sun was 216° C. Find the deviation for ship's head, given Var 7°E

(5 Marks)

B) On 29th November 2008 in position 30° 22' S 070° 40'W, the rising sun bore 119° (C). If variation was 4° E, find the Deviation of the compass. **(5 Marks)**

18. On 2nd Sept 2008, in DR position 19° 32'N, 60° 30'E, Sextant Meridian Altitude of Sun's UL was 78.5°. If IE was 3' ON the arc, HE 15m; calculate the Latitude of the Observer and the Direction of LOP. **(10 Marks)**

19. A) What do you mean by Lower Meridian passage? What are the conditions necessary for a body to be circumpolar? **(3 Marks)**

B) The true altitude of a star at upper meridian passage and lower meridian passage were 65° and 15° respectively, to an observer in the Northern hemisphere. At both transits the star bore North. Find his Latitude and the direction of the star. Also draw appropriate diagram. **(7 Marks)**

20. On 12th September, GMT 17h 31m, in DR position 28° 51' N, 170° E, the sextant altitude of pole star was 29° 39.1' HE - 15m, IE - 2' On the arc. Find the direction of LOP and the position through which to draw it. If azimuth was 001.5° (C) and Var 2° W, find the deviation of the compass. **(10 Marks)**

