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 ≥ Declination of the Celestial body
   b) Lat.of Observer ≥ Polar distance of the Celestial body
   c) Lat.of Observer ≤ Polar distance of the Celestial body
   d) Lat.of Observer ≤ Declination of the Celestial body

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°00'N 073°00'E) on 29th NOV.2008

13. Explain Kepler's 2nd law of planetary motion.

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)**

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