

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**End Semester Examinations – June 2025**  
**Programme Name: DNS**  
**Semester: II**  
**Subject Code: UD11T6204**  
**Subject Name: Celestial Navigation**

Date: 04.06.2025  
Duration: 03 Hrs

Max Marks: 70  
Pass Marks: 35

General Instructions :

- (i) All Questions are to be attempted.
- (ii) Nautical Almanac 2008, Nories Tables are permitted.
- (iii) Use of Non-programmable Scientific Calculator is permitted.

**Section A**

**(Answer all questions. Ten MCQs / Fill in the blanks of 01 Mark each –  
Choose the correct answer as applicable)**

1. The Zenith distance is
  - a. An arc of the Vertical circle passing through the body.
  - b. An arc of the Prime vertical circle
  - c. An arc of the Principal vertical circle
  - d. An arc of the Equinoctial.
2. Altitude of celestial body above \_\_\_\_\_ Horizon is called apparent altitude.
3. GHA of a celestial body is  $100^\circ$ . Its LHA is  $165^\circ$ . Longitude of the observer is:
  - a.  $065^\circ$  W
  - b.  $065^\circ$  E
  - c.  $015^\circ$  W
  - d.  $015^\circ$  E
4. Of Upper and Lower meridian passages of a Circumpolar body, the lower Meridian altitude will always be greater.
  - a. True
  - b. False
5. The length of 1 Astronomical unit is
  - a. 95 Million Kilometres
  - b. 100 Million kilometres
  - c. 150 Million Kilometres
  - d. 93 Million Kilometres
6. In PZX triangle, angle P is:
  - a. Equal to LHA when celestial body is East of meridian.
  - b. Equal to LHA when celestial body is West of meridian.
  - c. Equal to  $360 - \text{LHA}$  when celestial body is West of meridian.
  - d. Equal to GHA when celestial body is West of meridian.

7. Time based on the average length of a Solar day throughout the year is known as
- Sidereal Mean Time
  - Apparent Solar time
  - Greenwich Mean Time
  - Local Mean Time
8. If the LHA of a body is  $0^{\circ}$ , the body is
- On the Lower meridian
  - On the Prime vertical, east of the observer
  - On the Prime vertical west of the observer
  - On the Upper meridian
9. The maximum declination of the Moon varies between  $18.4^{\circ}$  to  $28.6^{\circ}$  degrees
- True
  - False
10. A Lunar Eclipse can only occur on
- New moon phase
  - Gibbous Moon phase
  - Full Moon phase
  - Crescent Moon phase

### **Section B**

**Answer all the questions (Five Questions of 02 Marks each)**

- Calculate the GP of Rasalhague on 21<sup>st</sup> July 2008 at GMT 05H 40M 30S.
- With regards to period of daylight and darkness, explain where is the overhead Sun and what happens at Equator and also at all places between arctic circle and N Pole during June Solistice?
- State Kepler's 1<sup>st</sup> and 2<sup>nd</sup> laws of Planetary motion.
- State the conditions needed to be fulfilled for a body to be Circumpolar.
- Define Zenith and Rational Horizon.

### **Section C**

**(All questions are compulsory)**

- An observer obtains the meridian altitude of a body as follows: above the Pole  $88^{\circ} 00'$  to the south and below the pole  $10^{\circ} 15'$  to the North. Calculate the Latitude and Declination. Draw a neat diagram to show your understanding. **(10 Marks)**
- On 27<sup>th</sup> April 2008, in DR position  $31^{\circ} N$  and  $46^{\circ} 15' W$ , the rising Sun bore  $075^{\circ}$  degrees by Compass. If Var was  $3^{\circ} W$ , find deviation. Draw a neat diagram to show your understanding. **(5 Marks)**
- Explain Civil, Nautical and Astronomical Twilight. **(5 Marks)**

18. a. A celestial body Zenith distance is  $20^{\circ}$  and its azimuth is  $000$ . At this time its declination is  $5^{\circ}$  N. What is Latitude of observer. Draw diagram to explain your answer. **(Diagram 2 Marks, Calculation 1 mark)**

b. On 01 May 2008, in DR longitude  $179^{\circ} 58'$  E, the Sextant altitude of the Sun's LL on the meridian was  $64^{\circ} 34.9'$  South of observer. Index error  $1'$  off the arc and HE =  $15\text{m}$ , find the latitude and state the direction of the LOP. **(7 Marks)**

19. On 10<sup>th</sup> October GMT 10H30M in DR  $40^{\circ} 15'$  N  $60^{\circ} 42'$  E, Saturn bore  $262^{\circ}$  Gyro. Find the Gyro error. Draw a neat diagram to show your understanding. **(10 Marks)**

20. On 31 Aug 2008 GMT 17h 22m 26s, ship in DR  $18^{\circ} 00'$  N  $178^{\circ} 11'$  E, the sextant altitude of the Pole star was  $18^{\circ} 47.4'$ . HE =  $12.5\text{ m}$  and IE =  $1.6'$  on the arc. Find the direction of LOP and a position through which to draw it. If the azimuth was  $001^{\circ}$  (C), and variation was  $1.3^{\circ}$  E, find the deviation for that compass course. **(10 Marks)**

