INDIAN MARITIME UNIVERSITY

(A Central University Government of India)

END SEMESTER EXAMINATIONS- JUNE 2022

B. Sc (NAUTICAL SCIENCE): Semester - III

CELESTIAL NAVIGATION – I : SUBJECT CODE: UG21T4301

Use of selected pages of Nautical Almanac 2008, Nories Table and Non- programmable scientific calculator is permitted

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Max. Marks: 70 **Date: 17.05.2022**

Pass Marks: 35 **Time: 3 hours**

PART A is compulsory .

Q.1 Multiple choice questions [10 x 1 = 10 Marks]

(i)	**The planet that completes its rotation around the Sun in shorter time than the Earth is: -**	**ANSWER**
A	Superior planet	
B	Dwarf planet	
C	Inferior planet	
D	Super Nova	
(ii)	**Vernal Equinox occurs on: -**	
A	22nd Dec	
B	21st March	
C	21st June	
D	23rd Sept	
(iii)	**The planet furthest from Sun amongst the following: -**	
A	Jupiter	
B	Mars	
C	Earth	
D	Saturn	
(iv)	**When at aphelion: -**	
A	Sun is furthest from Moon	
B	Earth is closest to Sun	
C	Earth is equidistant from Sun and Moon	
D	Earth is furthest from Sun	
(v)	**Tropic of Cancer: -**	
A	Is the parallel of latitude in Northern hemisphere equal to the Sun's greatest Northern declination	
B	Is the parallel of latitude in Southern hemisphere equal to the Sun's greatest Northern declination	
C	Is the parallel of latitude equal 66.66° S	
D	None of the choices	
(vi)	**The brighter the star seen from earth: -**	

A	Smaller is its magnitude number	
B	larger is its magnitude number	
C	Closer the star is	
D	None of the choices	
(vii)	**In the Nautical Almanac following data are not available: -**	
A	Meridian passage time of Sun	
B	Upper and lower meridian passage of Moon	
C	Daily semi diameter of planets	
D	Civil and nautical twilight time	
(viii)	**Great circle that passes through the Zenith, Nadir of the observer and the east and west points on rational horizon is: -**	
A	Principal Vertical circle	
B	Prime Vertical circle	
C	Longitude of the observer	
D	None of the choices	
(ix)	**The complement of declination is called: -**	
A	Co- Altitude	
B	Zenith Distance	
C	Co- Latitude	
D	Polar distance	
(x)	**Standard time is: -**	
A	Same as zonal time	
B	Time corresponding to longitude of the observer	
C	Official time kept at a place or country	
D	Time of meridian passage of Sun	

PART - B is compulsory **[2 x 5 = 10 Marks]**

Q. 2 A) Define Rational horizon.

B) Define Greenwich Mean Time (GMT).

C) Define perihelion.

D) Define elevated and Depressed celestial pole.

E) Define Local Hour Angle (LHA) of a celestial body.

PART - C ANSWER ANY 5 OUT OF THE 7 QUESTIONS

Q. 3 A) Using a neat diagram explain obliquity of the ecliptic. **(5 Marks)**

B) Explain the reasons of unequal hours of daylight and darkness in a day with neat diagrams. **(5 Marks)**

Q. 4 A) What are Kepler's Law of planetary motion? **(5 Marks)**

B) Explain with a diagram what causes the eclipse of the Sun?

(5 Marks)

Q. 5 A) Define Local Mean Time (LMT). What is the relationship between LMT and LHA of the Sun? **(5 Marks)**

B) Fill in the blanks in the table below: - **(5 Marks)**

GHA	089° 49.4′	165° 47.4′		047° 00.1′	294° 44.3′
Long	130° 27′ W		178° 11.0′E		075° 00′E
LHA		357° 36.4′	59° 03.0′	312° 30.1′	

Q. 6 A) Define Dip correction. Explain why does the dip correction change for the same ship. **(5 Marks)**

B) On 26th May 2008, in DR 14° 04′ N; 174° 54′W, the sextant altitude of the Sun's UL was 36° 50.5′. If the IE was 2.0′ off the arc and HE was 16.2 mtrs, find the true zenith distance of the Sun. (Dip corr given 7.1′ and Total Corr given 17.1′). **(5 Marks)**

Q. 7 A) On 2nd Sept in Longitude 049° 59′ E the true Sextant meridian altitude of the Sun was 34° 24.8′ South of the observer. The Declination of the Sun at meridian passage was 08° 06.2′ N. Find the latitude of the observer and the direction of the position line. **(5 Marks)**

B) Draw and show the following on the plane of the rational horizon.

i. Prime vertical circle
ii. Equinoctial
iii. Zenith
iv. Elevated North pole
v. North declination circle of Sun **(5 Marks)**

Q. 8 A) With a neat diagram prove that the altitude of the elevated pole above the Rational Horizon is equal to the latitude of the observer. **(5 Marks)**

B) Why does a ship advance and retard clocks during its passage from one port to another? **(5 Marks)**

Q.9 A) What are the contents of the daily pages of the Nautical Almanac? **(5 Marks)**

B) Explain with a neat diagram Parallax in altitude. **(5 Marks)**

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