

**INDIAN MARITIME UNIVERSITY**  
(A Central University, Government of India)  
**End Semester Examination Dec 2019/Jan 2020**  
**B.Sc. (Nautical Science)**  
**Semester -III**  
**UG11T3301- Celestial Navigation Paper-I**

**Date: 09.12.2019**

**Max Marks: 70**

**Time: 3 Hours**

**Pass Marks: 35**

**Note: Question No. 1 is compulsory.**

**Answer any 6 questions from remaining 8 questions (each of 10 marks).**

**Use of Nautical Almanac & non-programmable Scientific Calculator is permitted if required.**

Q.1 Define the following: (5 x 2 = 10 marks)

- (a) Ecliptic
- (b) Right Ascension
- (c) Local Hour Angle
- (d) Polar distance
- (e) Geographical position of a heavenly body

Q2.(a) What do you mean by equinoctial system of units ? Write the position of Vega at 1800 GMT on 22 August 08 in terms of equinoctial system of units (5 marks)

(b) With diagram indicate "Equinoxes" & "Solstices". Also state the dates. When these phenomena take places. (5 marks)

Q3. Explain with diagram "Partial" & "Total" lunar eclipses. (5+5 marks)

Q4. Explain with diagram the three laws of "Kepler's Laws of Planetary motion". (2+4+4 marks)

Q5. (a) Find the Geographical position (GP) of the Sun on 23 August 08 at GMT 123415 (5 marks)

(b) Convert LMT 22h35m45s to ZT in position  $10^{\circ}15' S$   $038^{\circ}05' W$ . (5 marks)

Q6. Find the True Zenith distance of the moon, if the sextant altitude of the moon's upper limb was  $40^{\circ}15'$  on 29 April 2008 at GMT 07h16m14s. Index error =  $+2.3'$ . H.E. = 17 metres. (10 marks)

Q7. (a) List the corrections to be applied in sequence to sextant altitude to obtain the true altitude (5 Marks)

(b) Find the True Altitude of the Sun, if the sextant altitude of the Sun's lower limb was  $30^{\circ}35'$  on 29 Nov 2008. Index error =  $-2.5'$ . H.E. = 15 metres. (5 marks)

Q.8. On 29 February 08, in DR position  $32^{\circ}20' S$   $106^{\circ}15' E$  the sextant altitude of Sun's Upper Limb on the meridian was  $65^{\circ}29'$ . HE = 10 metres and IE =  $-2.0'$ . Find the latitude and the direction of the Position line. (10 Marks)

Q.9. Draw the Plane of the Horizon and indicate observer's Zenith, rational horizon, equinoctial, elevated pole, altitude of heavenly body, Azimuth of heavenly body & prime vertical circle. (1+1+1+1+3+3 Marks)