

**INDIAN MARITIME UNIVERSITY**  
 (A Central University Government of India)  
**END SEMESTER EXAMINATIONS- June-July 2019**  
**Diploma in Nautical Science**  
**Semester: I**  
**NAVIGATION – I: TERRESTRIAL & CELESTIAL**  
**(UD11T4104)**

**Date: 27-06-2019**  
**Time: 2 hours**

**Max. Marks: 70**  
**Pass Marks: 35**

**Note: Use BA Chart 813 (South Coast of Sri Lanka) for Chart work**  
**Use of Selected pages of Nautical Almanac 2008, Norie's**  
**Tables and Non-programmable type Scientific Calculator is**  
**allowed in the Exam Hall.**  
**Draw Sketches wherever required.**

**Part A: TERRESTRIAL & CELESTIAL NAVIGATION**

Note: Q. No. 1 & 2 are compulsory. Answer any 2 out of remaining 3 .

1. Define: **(1 x 5 = 5 marks)**
  - (a) Great Circle
  - (b) Parallels of Latitude
  - (c) Departure
  - (d) Meridional part
  - (e) Leeway
  
2. (a) List salient features of Mercator projection **(3 marks)**
  - (b) Find rhumb line course and distance from position P 23°30'N, 135°00'W to position Q 20°00'S, 150°00'E using Mercator Sailing method. Show neat sketches with labels to demonstrate your understanding. **(7 marks)**
  
3. (a) From a position in North Hemisphere at latitude 'X', a vessel sails 'North' x 120 NM and then 'East' x 240 NM. If the D'Long achieved is 480 minutes after Easterly leg of travel, find Latitude 'X'. **(4 Marks)**
  - (b) On 27th April 2008, Sextant altitude of Sun's UL was 68°30.5'. Given I.E. 1.2' on the arc and the H.E. as 20.4 m, find the True Zenith distance of the Sun **(6 Marks)**
  
4. At noon on 29<sup>th</sup> Feb 2008, a vessel in position 13°30'N, 178°00'W, set course as follows – **(10 Marks)**

<b>Time</b>	<b>Compass Course</b>	<b>Dev</b>	<b>Var</b>	<b>Leeway</b>	<b>Wind</b>	<b>Log</b>
<b>1200</b>	172	3 W	3 W	4°	W x N	0
<b>2000</b>	245	1 W	4 W	4°	N	110
<b>0400</b>	340	3 E	4 W	5°	NE	230
<b>1200</b>	210	1 W	3 W	5°	W	330

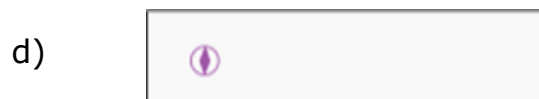
The current was setting  $270^\circ$  T at 2.0 Kts after **midnight** on 29<sup>th</sup> Feb till following noon. Find estimated position at 1<sup>st</sup> March noon.

5. (a) Define Celestial Poles, Equinoctial, Celestial Meridians, Rhumb Line and Obliquity of Ecliptic **(5 Marks)**
- (b) A vessel sailed from position A ( $60^\circ 00'N$ ,  $178^\circ 30'E$ ) to position B ( $65^\circ 00'N$ ,  $179^\circ 00'W$ ). Find the Course and distance steamed by plane sailing triangle. (Sketch expected) **(5 Marks)**

**Part B: CHART WORK (Chart No BA 813)**

Note: Q. No. 6 is compulsory and carries 5 marks. Attempt any 3 out of the remaining four, they carry 10 marks each.

6. Identify the Symbols and Abbreviations of the following as per 5011 **(5 Marks)**



e) MHWS

7. Write short notes on **(2 x 5 = 10 Marks)**

- Estimated position
- Temporary correction
- Ocean charts
- Deviation
- Dead Reckoning

8. a) At 0300 hrs Dondra head light bore  $342^\circ(C)$  (Var  $1^\circ W$ , Dev  $3^\circ E$ ), distance by Radar 12'. Find the position.
- b) From above position find course to steer to pass Great Basses reef light 11 Nm off on Port side.
- c) Find time when Great Basses reef light will be abeam. (Ship's speed 12 knots) **(10 Marks)**

9. Great Basses Reef Light bore  $290^\circ$  (T) at 1730 hours. At 1800 hrs Little Basses reef light bore  $011^\circ$  (T). If during this period vessel steered  $020^\circ$ T and speed of 14 knots. Find Ship's position at 1730 and 1800 hours. **(10 Marks)**

10. RATMALANA (AERO AL.FL.WG) light (Approx Position-  $06^\circ 49'N$   $079^\circ 53'E$ ) and OLEGODA (Approx Position-  $06^\circ 47'N$   $080^\circ 00.5'E$ ) (114 mtrs) are in transit from a ship. Observed compass bearing is  $112^\circ$ (C)degrees. If the distance from RATMALANA light is 12 NM.

(a) Find position of the ship.

(b) Also, if variation is  $3^\circ$ W, find compass error and deviation.

**(10 Marks)**

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