

INDIAN MARITIME UNIVERSITY
(A Central University, Government of India)
End Semester Examination December 2019
DIPLOMA IN NAUTICAL SCIENCE (DNS)

Semester: II
NAVIGATION III: TERRESTRIAL, COASTAL & CELESTIAL NAVIGATION
(UD11T4201)

Date: 09-12-2019
Time: 3 Hrs

Max Marks: 70
Pass Marks: 35

Note: Use BA Chart 2675 or INT 5049 (English Channel) for Chart work.
Use of Selected pages of Nautical Almanac 2008, Norie's Tables and Non-programmable type Scientific Calculator is permitted in the Exam Hall.
Exam Centers to provide 'Luminous Range Diagram' and 'Tide Curve Diagram' (from ATT 3) to candidates (if required)
Draw Sketches wherever required.

PART – A: TERRESTRIAL AND CELESTIAL NAVIGATION

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

- 1) Define the following: **(1 x 5 = 5 Marks)**
- a. Greenwich Hour Angle (GHA)
 - b. Prime Vertical Circle
 - c. True Zenith distance
 - d. First Point of Aries
 - e. Vertex of a Great Circle
- 2) On 30th April 2008 at GMT 13h 00m 52s, the sextant altitude of the Sun's UL, east of the meridian, was observed to be $44^{\circ} 13.4'$ by a vessel in DR $00^{\circ} 20'N$; $060^{\circ} 12'W$. The index error of the sextant was $3.1'$ off the arc and H.E. was 20 m, find the intercept and the direction of the LOP. **(10 Marks)**
- 3) a) With appropriate sketch explain Time Zones and the concept of advancing and retarding of hours and days at sea by Merchant ships. **(5 Marks)**
- b) On 1st May 2008 in DR $30^{\circ} 06'N$, $179^{\circ} 45'W$, the setting sun bore $285^{\circ}(C)$ if the variation is $2^{\circ}W$, find the deviation for the ship's head. **(5 Marks)**
- 4) a) Calculate the LHA of star Dubhe (GMT-31st Aug 2008, 17h 22m 26s; Long: $150^{\circ} 00.0'E$). **(5 Marks)**
- b) An observer in DR Longitude $150^{\circ}E$ observed the sextant altitude of Pole Star as $50^{\circ} 45'$ and the bearing as $005^{\circ}(C)$, when the GMT was 30th Apr 17h 30m 30s. Calculate the deviation of the compass, direction of the LOP and a position through which to draw it. (Given; HE= $14m$, IE= $1.8'$ off the arc, Variation= $1^{\circ}E$) **(5 Marks)**
- 5) Calculate the shortest distance from $32^{\circ} 12'N$ $018^{\circ} 15'E$ to $05^{\circ} 40'N$ $034^{\circ} 20'W$. Also calculate the course to be set at the commencement of the voyage. **(10 Marks)**

PART – B: CHART WORK

(Note: Q. No. 6 is compulsory and carries 5 marks. Answer any 3 out of 4.)

- 6) a) Explain all types of Notice to Mariners (Weekly, Cumulative & Annual) with reference to the interval at which they are issued, their contents and use. **(5 Marks)**
- 7) At 1800 Hrs a vessel steering 030° (G), observed Casquets Lt. bearing 083° (G) and again at 1900 Hrs it bore 131° (G). The current was known to be setting 346° (T) at 2 knots throughout. Find the ship's position at 1900 Hrs and also estimate the position at 2100 Hrs. (Ship's Speed 12 Knots, Gyro Error 3° H). **(10 Marks)**
- 8) At 1000 hrs a vessel while steering 065° (T) at 14 kn, observed Eddystone rocks Lt. bearing north at a distance of 11 M. She maintained her course and speed and at 1130 hrs, she observed Start Point Lt. bearing 354° (T) at a distance of 8 M, if the wind is North westerly, force 7, cause a leeway of 5° .
- (a) Find the set, total drift and rate of drift during the above period.
- (b) From 1130 hrs. position, find CTS to pass Bill of Portland Lt. 10 M off to port, if the wind and current remained same.
- (c) At what time will the same light be abeam. **(10 Marks)**
- 9) Find the under-keel clearance (UKC), a vessel would have at 1430 hours on 2nd March at a position off Singapore. The charted depth is 4m and maximum draft of the vessel is 4.5 m. Extract from the Tide Tables for the day is given below: **(10 Marks)**

Date: 2 nd March	Place: Singapore
Time	Height
0014	2.7 m
0603	0.8 m
1209	2.9 m
1830	0.6 m

- 10) (a) Draw a neat sketch of a Preferred Channel to Port buoy in Region-A. **(5 Marks)**
- (b) With respect to passage planning explain: No go areas, clearing range, clearing bearing and wheel-over point. **(5 Marks)**
