

**INDIAN MARITIME UNIVERSITY**  
(A Central University, Government of India)  
**End Semester Examination Dec 2019/Jan 2020**  
**B.Sc. (Nautical Science)**  
**Semester -I**  
**UG21T3106- Terrestrial Navigation**

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**Date: 21.12.2019**  
**Time: 3 Hours**

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

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Note: Question No 1 is compulsory  
Solve any 6 questions from remaining 8 questions (each of 10 marks).  
Norie's Nautical Table and Scientific Calculator are permitted if required  
Draw Diagrams/Sketches/figures for explanation where necessary

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Q.1 (2x5=10 marks)

- (a) Define the following:  
(i) Great Circle (ii) Departure (iii) DMP
- (b) State:  
(i) Plane Sailing formula  
(ii) Mercator Sailing formula

Q.2 (10 marks)

From A:  $45^{\circ}\text{N } 100^{\circ}\text{W}$  to B:  $30^{\circ}\text{S } 130^{\circ}\text{E}$ , find

- (a) Great Circle distance (b) Initial Course (c) Final Course  
(d) Vertex Position (e) Mercator sailing course and distance

Q.3 (10 marks)

At noon on 14 th Dec from position  $05^{\circ} 46.0' \text{N } 80^{\circ} 36.7' \text{E}$ , course was set to  $220^{\circ}(\text{C})$ , Dev  $1^{\circ}\text{E}$ , Var  $2^{\circ}\text{W}$ , Log 0. At 2000 engines broke down when the Log showed 82. At 2200, engines were repaired and course was set to  $200^{\circ}(\text{C})$  Dev Nil, Var  $2^{\circ}\text{W}$ , log reset to 0. Ship maintained this course till noon next day when Log showed 140. A current was estimated to set  $350^{\circ}(\text{T})$  at 2 knots throughout. Find the EP at noon on 15 th Dec.

Q.4 (2x5=10 marks)

- (a) Briefly explain why does the length of a Nautical mile varies with Latitude.
- (b) Find the length of a Nautical mile at  $60^{\circ} \text{S}$  latitude.

Q.5

(2x5=10 marks)

(a) In the following cases,

	<u>Find</u>	<u>Given</u>
i.	Compass Error	Dev $2^{\circ}$ E, Var $3^{\circ}$ W
ii.	Variation	Compass Error $4^{\circ}$ E, Dev $2^{\circ}$ W
iii.	Deviation	Compass error Nil, Var $2^{\circ}$ E
iv.	True Course	Compass Course $150^{\circ}$ C, Var $2^{\circ}$ E, Dev for $150^{\circ}$ C= $2.7^{\circ}$ E
v.	Compass Course	True Course $170^{\circ}$ , Var $2^{\circ}$ W Dev on $161^{\circ}=5.1^{\circ}$ W, on $166.5^{\circ}=5.3^{\circ}$ E & on $172^{\circ}=5.5^{\circ}$ W

(b) Briefly explain Deviation and Variation.

Q.6

(2x5=10 marks)

(a) Find the course and distance from A  $04^{\circ} 16' S$   $177^{\circ} 37' W$  to B  $02^{\circ} 29' N$   $179^{\circ} 24' E$ .

(b) Your ship in position A  $20^{\circ} 11' N$   $072^{\circ} 52' W$  sailed on course 032(T) for 238 nms, find B the position arrived

Q.7

(2x5=10 marks)

(a) Enumerate the advantages and disadvantages of Mercator and Gnomonic charts.

(b) What is meant by Natural Scale of a Chart. Find the natural scale of a Mercator chart in latitude  $58^{\circ}$ , given that the longitude scale is 10 cms to one degree of longitude.

Q.8

(10x1=10 marks)

Indicate the following on the World map :

Suez Canal, Gibraltar, Gulf of ADEN, Visakhapatnam Port, Black Sea, Panama Canal, Port Said, Mediterranean sea, Malacca Straits, St Lawrence Seaway.

Q.9

(2x5=10 marks)

(a) Why is the position of Vertex important in planning a Great circle track.

(b) Find the initial course, final course and the distance along the composite track from A :  $51^{\circ} 20' N$   $010^{\circ} 00' E$  to B :  $52^{\circ} 00' N$   $55^{\circ} 00' E$ , having a ceiling latitude of  $53^{\circ} N$ .