



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology
Department of Mechanical & Automotive Engineering
UNIVERSITY EXAMINATION FOR:
Diploma in Nautical Sciences
ANS 2208 : Celestial Navigation II
SPECIAL/ SUPPLEMENTARY EXAMINATION
SERIES: AUGUST 2019
TIME: 2 HOURS
DATE: Pick Date Aug 2019

Instruction to Candidates:

You should have the following for this examination

- *Student I.D. Card & Examination Pass*
- *Answer booklet*
- *Non-Programmable scientific calculator*

This paper consists of **FIVE** questions. Attempt any **THREE** questions.

Maximum marks for each part of a question are as shown.

Do not write on the question paper.

Question ONE

- a) At morning twilight on October 12th; 1990 a ship was in DR position (36' 16'S; 175' 18E). Calculate the geographical position of the star Achernar at Ch. Time 05h 08m 03sec
Where ch.err 4m 44s slow (10 marks)
- b) If LMT 07h 20m 33s may 23th for an observer in long 96'34'E. Find the GMT (5 marks)
- c) Describe the relationship between altitude of the pole and latitude of an observer (5 marks)

Question TWO

Describe the diurnal annual motion of the sun for observers in different latitude in all the 5 cases.

(20 marks)

Question THREE

- a) When does a day start according to celestial navigation **(4 marks)**
- b) State the 1st and 2nd equatorial system of coordinates **(6 marks)**
- c) Describe the following terms as used in navigation **(10marks)**
- i. Equinoctial
 - ii. Declination
 - iii. Horizon
 - iv. Zenith
 - v. Altitude

Question FOUR

At zone time 1200 on June 27, 1990 a ship was in DR $48^{\circ} 25.7' N$, $128^{\circ} 38' W$, Ch time 9hrs 2min 44 sec, ch err 4min 10sec fast. Index error 1.2 min off arc height of eye 9m and your sextant altitude $64^{\circ} 26.0'$ altitude of the sun was measured to the lower limb. Find the elements to your position lines.

(20 marks)

Question FIVE

During the evening civil twilight on Aug 6th 1990 a ship was in DR ($39^{\circ} 15' N$, $177^{\circ} 50' W$) Ch err 1m 40 sec slow on GMT. I.E 1.4 'off arc; Height of eye 14m 'Ch. Time 30m 14 sec. The sext Alt of the Polaris was $38^{\circ} 48'$. Calculate the LHA and the GMT

(20 marks)