



TECHNICAL UNIVERSITY OF MOMBASA

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Faculty of Engineering and Technology  
Department of Mechanical & Automotive Engineering  
UNIVERSITY EXAMINATION FOR:  
Diploma in Nautical Sciences  
ANS 2208 : Celestial Navigation II  
END OF SEMESTER 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.**

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**Question ONE**

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

Find the elements to your position lines **(20 marks)**

**Question TWO**

During the evening civil twilight on Aug 6<sup>th</sup> 1990 a ship was in DR (39° 15'N, 177° 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° 48'. Calculate the LHA and the GMT

**(20 marks)**

### **Question THREE**

- a) State 6 components of solar system **(6 marks)**
- b) State the planets used in navigation **(4 marks)**
- c) Draw and describe perihelion and Aphelion according to the rotation of the sun **(10 marks)**

### **Question FOUR**

- a) What's orbital eccentricity **(2 marks)**
- b) Describe the 3 Kepler's planetary motion laws **(6 marks)**
- c) Describe the following terms? **(12 marks)**
  - i. Mean solar day
  - ii. Apparent solar day
  - iii. Sidereal day
  - iv. local mean time
  - v. Greenwich mean time
  - vi. Greenwich Apparent time

### **Question FIVE**

Describe how the season occur in celestial navigation and indicate the RA, SHA, DEC and the date.

**(20 marks)**