



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES**

**DEPARTMENT OF MATHEMATICS AND STATISTICS**

<b>QUALIFICATION:</b> Bachelor of science ; Bachelor of science in Applied Mathematics and Statistics	
<b>QUALIFICATION CODE:</b> 07BOSC; 07BSAM	<b>LEVEL:</b> 5
<b>COURSE CODE:</b> AAT501S	<b>COURSE NAME:</b> ALGEBRA AND TRIGONOMETRY
<b>SESSION:</b> JULY 2022	<b>PAPER:</b> THEORY
<b>DURATION:</b> 3 HOURS	<b>MARKS:</b> 100

<b>SECOND OPPORTUNITY/ SUPPLEMENTARY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER</b>	MRS L. KHOA MR G. TAPEDZESA
<b>MODERATOR:</b>	DR S.N. NEOSSI NGUETCHUE

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer ALL the questions in the booklet provided.</li><li>2. Show clearly all the steps used in the calculations.</li><li>3. All written work must be done in blue or black ink and sketches must be done in pencil.</li></ol>

**PERMISSIBLE MATERIALS**

1. Non-programmable calculator without a cover.

**THIS QUESTION PAPER CONSISTS OF 3 PAGES (Including this front page)**

### QUESTION 1 [12 Marks]

Workout the following without a calculator:

(a)  $i^{27}$  [2]

(b) Solve for  $a$  and  $b$  if  $a - 3bi = (1 + i)^{-1}$  [5]

(c)  $\frac{2}{1 - 2i} + \frac{1 + 2i}{2}$  leave your answer in the form  $a + bi$ . [5]

### QUESTION 2 [21 Marks]

(a) Work out the following without a calculator:

i) Simplify  $-\left(\frac{x^{12}}{81}\right)^{\frac{3}{4}} \left(-\frac{x^9}{27}\right)^{-\frac{2}{3}} \left(\frac{1}{4}x^{-4}\right)$  [5]

ii)  $6^{x^2-1} - 6^{1-x^2} = 0$  [5]

iii)  $\frac{(e^{3x+1})^2}{e^4} = e^{10x}$  [6]

(b) Using the laws of logarithms:

i) show that  $\log_b a \cdot \log_c b = \log_c a$  [2]

ii) solve  $\log_7(\log_9 x^2) = 0$  [3]

### QUESTION 3 [30 Marks]

Solve:

(a)  $|2x - 5| + x = 2$  [7]

(b)  $3x^2 + 36 = 31x$  by completing the square [6]

(c)  $\log_2(x + 3) + \log_2(x - 3) < 4$  and write the answer in interval notation. [12]

(d)  $x + \sqrt{x - 4} = 4$  [5]

### QUESTION 4 [14 Marks]

Given the following sequences:

a) 9, 14, 19, 24, ...

b) 1024, 512, 256, 128, ...

Determine:

- (i) whether the sequence is arithmetic or geometric [1]×2
- (ii)  $d$  or  $r$  [1]×2
- (iii) formula for  $a_n$  [2]×2
- (iv)  $a_{25}$  [1]×2
- (v)  $S_{30}$  [2]×2

**QUESTION 5 [10 Marks]**

Decompose the following into their partial fractions:

(a)  $\frac{x^2 + 1}{x(x - 1)(x + 1)}$  [6]

(b)  $\frac{4}{(x - 2)(x + 2)}$  [4]

**QUESTION 6 [13 Marks]**

(a) Prove that  $\tan^2 x + 1 = \sec^2 x$  [4]

(b) Solve  $\cos x = \cos x \tan x$  for  $x$  in the interval  $[0^0, 360^0]$  [9]

**TOTAL MARKS: 100**

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**END OF PAPER**