



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

QUALIFICATION: Bachelor of science; Bachelor of science in Applied Mathematics and Statistics	
QUALIFICATION CODE: 07BOSC; 07BSAM	LEVEL: 5
COURSE CODE: AAT501S	COURSE NAME: ALGEBRA AND TRIGONOMETRY
DATE: JUNE 2022	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER	MRS. L. KHOA MR. G. TAPEDZESA
MODERATOR:	DR. S.N. NEOSSI NGUETCHUE

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

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^{91} [2]

(b) Solve for x and y if $x(3 - i^2) + y(8 - i^3) = i$ [4]

(c) $(1 + 2i)^{-2}$ leave your answer in the form $a + bi$. [6]

QUESTION 2 [21 Marks]

(a) Solve $10^{2x^2} - 10^{9-x^2} = 0$ [5]

(b) Solve $\frac{\sqrt{(e^{2x} \cdot e^{-x})^{-4}}}{e^x \div e^{-x}} = e^7$ [5]

(c) Solve for x : $(\log x)^2 - \log x^2 = 3$ [6]

(d) Rationalize the denominators of the following:

i) $\frac{2}{\sqrt[3]{x^2}}$ [2]

ii) $\frac{1}{1 + \sqrt{2}}$ [3]

QUESTION 3 [30 Marks]

Solve:

(a) $|x + 4| = 3x - 8$ [6]

(b) $x^2 + 4 = -5x$ by completing the square [6]

(c) $\log_{\frac{1}{2}}(x + 1) < \log_{\frac{1}{2}}(x + 8) - \log_{\frac{1}{2}}(x - 4)$ and write the answer in interval notation. [14]

(d) $\sqrt{x} + \sqrt{x + 11} = 11$ [4]

QUESTION 4 [11 Marks]

(a) Use the binomial theorem to find the coefficients of x , x^2 and x^4 in the expansion of $(2 - x)^7$ [6]

(b) State whether the following series exist or not

$$\text{i) } \sum_{k=0}^{200} (2k + 1) \quad [1]$$

$$\text{ii) } \sum_{k=0}^{\infty} x \left(\frac{1}{3}\right)^{k-1} \quad [1]$$

$$\text{iii) } \sum_{k=0}^{1000} 10 \left(\frac{3}{2}\right)^k \quad [1]$$

$$\text{iv) } \sum_{k=0}^{\infty} \frac{k}{2} \quad [1]$$

$$\text{v) } \sum_{k=0}^{\infty} \frac{4}{3} \left(\frac{1}{2}\right)^k \quad [1]$$

QUESTION 5 [12 Marks]

Decompose the following into their partial fractions:

$$\text{(a) } \frac{5x + 7}{x^3 - x^2 - 2x} \quad [7]$$

$$\text{(b) } \frac{x}{(x - 1)^2} \quad [5]$$

QUESTION 6 [14 Marks]

(a) Prove the following Trigonometric identities:

$$\text{i) } \sin x \cot x \sec x = 1 \quad [3]$$

$$\text{ii) } \tan^2 \theta - \sin^2 \theta = \sin^4 \theta \sec^2 \theta \quad [5]$$

$$\text{(b) Solve the following trigonometric equation for } x \text{ in the interval } [0^\circ, 360^\circ] \quad [6]$$
$$2 \cos^2 x + 3 \sin x = 3$$

TOTAL MARKS: 100

END OF PAPER