nAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES
SCHOOL OF NATURAL AND APPLIED SCIENCES
DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

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
SESSION: JULY 2023	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

SUPPLEMENTARY/ SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	MRS L. KHOA Mr G. MBOKOMA
MODERATOR:	DR S.N. NEOSSI NGUETCHUE

INSTRUCTIONS
1. Answer ALL the questions in the booklet provided.
2. Write clearly and neatly.
3. All written work must be done in blue or black ink.

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^{943} [2]

(b) Solve for x and y if $2i = xi(2 - 3i) - y(5 - 3i)$ [5]

(c) $(1 + \sqrt{-9})^{-2}$ leave your answer in the form $a + bi$ [5]

QUESTION 2 [20 Marks]

(a) State whether the following are true or false [5]

    i) $(\ln a)^k = k \ln a$

    ii) $\log_a(xy) = (\log_a x)(\log_a y)$

    iii) If $\log_a 6 = 4$ then $a^6 = 4$

    iv) $-\ln\left(\dfrac{1}{x}\right) = \ln x$

    v) $\log_{\sqrt{x}} x^k = 2k$

(b) Solve: $e^{2x} - 2e^x + 1$ [5]

(c) Simplify the following without a calculator:

    i) $\sqrt{\dfrac{2x^2 y^{-3} z^{-5} \cdot 8x^{-1} y^{-1}}{4x^{-3} y^{-4} z}}$ [3]

    ii) $3\sqrt{200} - 3\sqrt{18}$ [3]

(d) Solve: $\log x^{\log x} = 4$ [4]

QUESTION 3 [30 Marks]

Solve:

(a) $|x - 2| + 5 = 9x$ [5]

(b) $x^2 + cx + b = 0$ **by completing the square** [6]

(c) $\log_{\frac{1}{2}}(x - 6) + \log_{\frac{1}{2}}(x + 1) > -3$, represent the answer in interval notation [12]

(d) The product of two natural numbers is 24 and their difference is 2. What are the numbers? [7]

QUESTION 4 [10 Marks]

(a) Evaluate if it exists $\sum_{n=-2}^{\infty} \frac{10}{3} \left(\frac{3}{10}\right)^n$ without a calculator [5]

(b) Use the binomial theorem to find the 4th term in the expansion of $\left(x - \frac{1}{x}\right)^{10}$ [5]

QUESTION 5 [12 Marks]

Decompose the following into their partial fractions:

(a) $\dfrac{2-x}{x^2(x-4)}$ [6]

(b) $\dfrac{2}{x(x^2+1)}$ [6]

QUESTION 6 [16 Marks]

(a) Solve $4\cos\theta = \sec\theta$ for θ in the interval $\left[0^0, 360^0\right]$ [8]

(b) Verify: $\cos 3\theta = 4\cos^3\theta - 3\cos\theta$ [8]

TOTAL MARKS: 100

<hr>

END OF PAPER