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QUALIFICATIONS : **BACHELOR OF SCIENCE**	
QUALIFICATION CODE: **07BOSC**	LEVEL: **5**
COURSE: **ALGEBRA AND TRIGONOMETRY**	COURSE CODE: **AAT501S**
DATE: **JANUARY 2025**	SESSION: **1**
DURATION: **3 HOURS**	MARKS: **100**

SECOND OPPORTUNITY/SUPPLEMENTARY: EXAMINATION QUESTION PAPER

EXAMINER: MR GABRIEL S MBOKOMA

MODERATOR: DR S.N NEOSSI NGUETCHUE

INSTRUCTIONS:

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

PERMISSIBLE MATERIALS:

Non-Programmable Calculator

This paper consists of 3 pages including this front page.

Question 1 [37 marks]

Without using a calculator.

1.1 Simplify the followings:

a) i^{943}. [2]

b) $\left(1+\sqrt{-9}\right)^{-2}$ leave your answer in the form $a+bi$ [6]

c) $\dfrac{\sqrt{x^5}-\sqrt{x^7}}{2\sqrt{x^3}-x\sqrt{x}}$ [6]

1.2 Find the value of x and y if, $2i = xi(2-3i) - y(5-3i)$ [5]

1.3 Solve the following equations:

a) $10^y \times 5^{2y-2} \times 4^{y-1} = 1$ [5]

b) $\log_3(28-3^x) = 2^{\log_2(3-x)}$ [8]

c) $x^{\frac{2}{3}} - x^{\frac{1}{3}} - 6 = 0$ [5]

Question 2 [38 marks]

2.1) Find the value(s) of λ for which $\lambda x^2 + 2x + 1$ has a real and distinct roots. [5]

2.2) Solve the inequalities:

a) $|x+5| - x \leq 5$ [6]

b) $\log_{\frac{1}{2}}(9x-4) \leq \log_{\frac{1}{2}}(2x^2)$ [6]

2.3) Given the geometric series: $8x^2 + 4x^3 + 2x^4 + ...$

a) Determine the n^{th} term of the series. [2]

b) What value(s) of x will the series converge? [4]

c) Calculate the sum of the series to infinity if $x = \frac{3}{2}$. [4]

2.4) Without expanding, evaluate

$$\sum_{k=0}^{2000} \binom{2000}{k} (-2)^{2000-k}$$

[5]

2.5) Solve: $\dfrac{3}{x} + \dfrac{4}{y} = \dfrac{5}{2}$ and $\dfrac{5}{x} - \dfrac{3}{y} = \dfrac{7}{4}$ by elimination method. [6]

Question 3 [25 marks]

3.1) Find the coefficient of x^2 in the expansion of $\left(x - \dfrac{1}{x}\right)^{20}$ [7]

3.2) Decompose $\dfrac{x-1}{x(2x^2-x)}$ into its partial fractions. [8]

3.3) Show that $\dfrac{2\cos x - \sec x}{2\sin x} = \cot 2x$ [5]

3.4) Solve the following trigonometric equations

$$2\cos x - 1 = 0$$

[5]
