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QUALIFICATIONS : **BACHELOR OF SCIENCE**	
QUALIFICATION CODE: **07BOSC**	LEVEL: **5**
COURSE: **ALGEBRA AND TRIGONOMETRY**	COURSE CODE: **AAT501S**
DATE: **NOVEMBER 2024**	SESSION: **1**
DURATION: **3 HOURS**	MARKS: **100**

FIRST OPPORTUNITY: 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 [35 marks]

Without using a calculator.

1.1 Simplify the followings:

a) $\left(\frac{i^{326}-1}{i^{545}+1}\right)$. [7]

b) $\frac{1}{\sqrt[3]{x^2}}$ [3]

c) $\left(\frac{2.2^x+6.2^{x-1}}{5.4^x}\right)^{\frac{1}{x}}$ [5]

1.2 Find the value of x and y if, $(x+2i)+i(3-i)=3-yi^7$ [5]

1.3 Solve the following equations:

a) $(2+y^2)^2=(2y\sqrt{2})^2$ [5]

b) $\log_3\left[\left(\log_{\frac{1}{2}} x\right)^2-3\log_{\frac{1}{2}} x+5\right]=2$ [5]

c) $ax^2+bx+c=0$ (**using completing of squares method**) [5]

Question 2 [37 marks]

2.1) Find 0.272727(27) as a fraction? [5]

2.2) Solve the inequalities:

a) $x^2-2x-3<0$ [5]

b) $\log_{\frac{1}{3}}(3x^2)\leq\log_{\frac{1}{3}}(2-5x)$ [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) Find sum of the followings, if they exists.

$$\sum_{k=5}^{\infty}\left(\frac{1}{2}\right)^{k-1}$$

[5]

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

Question 3 [28 marks]

3.1) If the 2^{nd}, 3^{rd} and 4^{th} terms in the expansion of $(a+b)^n$ is 240, 720 and 1080 respectively, find the value of a, b and n? [10]

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

3.3) Show that $\dfrac{\sin x - \cos x}{\sin x + \cos x} = \dfrac{\tan x - 1}{\tan x + 1}$ [5]

3.4) Solve the following trigonometric equation

$$2\cos^2 x - \sqrt{2}\cos x = 0$$

[5]
