Candidates name: ………………………………………………………………………… combination …………………….

Signature: …………………………………….

P 425/1

MATHEMATICS

examiner use

ITEM	SCORE
ONE	
TWO	
THREE	
FOUR	
FIVE	
SIX	

Paper 1

April 2026

3 HRS

SENIOR SIX

Uganda Advanced certificate of education

Principal mathematics

Paper 1

END OF TERM 0NE ASSESSMENT

3 hours

INSTRUCTION TO CANDIDATES:

This paper consists of three sections A, B and C. It has seven examination items.

Section A has two questions answer only one item,

Section B has one compulsory item

Section c has two parts (I &II) answer only one each part

Mathematical tables and non-programmable calculator may be used**. Well-presented work is a must**

Answer four items in all.

Any additional item(s) answered will not be marked

Section A

ITEM ONE

There has been a terrorism threat in DRC in the recent months. To curb this problem the Ugandan $government\ has\ deployed\ two\ teams\ of\ soldiers;\ the\ infantry\ and\ the\ air\ force. The\ infantry\ has\ been$ divided into two groups. One group is situated at an earth coordinate given by the simultaneously equation as [$\mathbf{\log_2 x + 2\ \log_4 y = 4,\ \mathit{and}\ \log_{10}(x+y) = 1}$]. The second group is situated at coordinates given by **[$\mathbf{\log_{25} 4x^2}$ = $\mathbf{\log_5(3 - x^2)}$ and** $\mathbf{\log_4(6-y) = \log_2 y}$] at exactly 8 : 00pm , the air force noticed the noticed the terrorists are at distance $-7\left[\frac{(\sqrt{5}-2)^2-(\sqrt{5}+2)^2}{8\sqrt{5}}\right]$ kilometers away from the main town, Goma. The air force is planning to attack them if they confirm terrorists are more than 5km away from the main town but have not yet confirmed. The infantry commander finds a hard time in proving to his unit that if $\mathbf{x = \log_a bc\ , y = \log_b ac,\ z = \log_c ab\ \ \mathit{is}\ \ x + y + z = xyz - 2}$ since most of the young officers argue that is next to impossible.

Task

(a) Help the infantry commander to prove the argument to his unit.

(b) Calculate the coordinate for the location of each of the groups and state how far are the two groups are apart.

(c) Based on calculations, show whether or not it is safe for the air force to attack the terrorists given the sated conditions

Item two

An alternating current (A.C) Circuit has an impedance $\boldsymbol{z} = \frac{\mathbf{(2+3i)^2(1-i)^3}}{\mathbf{1-5i}}$ and current $I = \frac{2i}{3+4i}$. Engineers are required to obtain the voltage V across the circuit using ohm's law, $v = IZ$ and the magnitude of his voltage. The current size supplied has to be increased if the voltage size is less than 10. The minister of energy happens to make an visit at site and tasks the chief engineer to solve **z^3 + 27 = 0** to find all the possible roots

Task

(a) Find out whether the current should be increased .

(b) Help the engineer to solve the equation to secure his job

Section B

This item is compulsory

item three

You have participated in an annual math contest in which all schools within yours district has to take part by sending a single representative per school. In the group's stages, each participant randomly chooses three questions to answer from the box, selecting a question after the other. Qualified candidates move the semi – finals, and at this stage, all competitors answer two similar questions. The best two qualify for the final round which declares the winner of the contest.

Task

(a) Suppose your qualified for the semi- final ,through picking and answering the questions below

1. " Given that $\text{COS } 2A - COS\ 2B = -P\ \ and \sin 2A\ - Sin\ 2B = Q\ , prove\ that$ sec(A+B) = $\frac{1}{Q}\sqrt{P^2 + Q^2}$ "

2. " Prove that in any triangle ABC , $\frac{b^2-c^2}{a^2} = \frac{\sin(B-C)}{Sin(B+C)}$ "

3. "Show that $\tan\left(\frac{\pi}{4} + \theta\right) - tan\left(\frac{\pi}{4} - \theta\right)$ = 2tan 2θ "write yours responses.

(b) You were given two question below at the semi finals

1. **"** describe the equation of the locus of the complex number Z which moves in the Argand diagram such that arg $\left(\frac{z-3}{z-2i}\right) = \frac{\pi}{4}$

2. " the equation $3x^2 - 7x - 1 = 0$ has roots $\alpha\ and\ \beta$. find the values of $(\alpha - \beta)^2$ and $(\alpha^{-4} + \beta^{-4})$. Hence form a quadratic equation whose roots are $(\alpha - \beta)^2$ and $\alpha^{-4} + \beta^{-4}$ .suppose you still qualified for the finals, write your responses.

(c) You emerged the winner of the competition after correctly responding to the question below. Write yours responses.

“Prove the identity$\cos^6 x + \sin^6 x = 1 - \frac{3}{4}\sin^2 2x$ ”

Section c

Part I

Answer only one item from each part

ITEM FOUR

A police patrol on Kampala jinja road found a dead body of a man lying in the middle of the road at exactly 7: 00 am and its body temperature was 30°c, 10 minutes later the police surgeon measured the body temperature and found it to be 28.5°c . if the normal body temperature is 37°c . The forensics team came up the equation $\frac{dy}{dx} + 2ytanx = \cos^2 x\ .at\ y(0) = 2$ and asserted that where the man was hit.

Task

(a) Find the particular solution of the equation the man was hit

(b) Estimate the time at which the man was killed given the temperature of the surrounding air is 25°c

ITEM FIVE

An electrical engineering student at Gulu university is analyzing a signal whose behavior overtime x is related to the function $g(x) = \frac{36}{(x-1)^2\ (x+5)}dx$ this function needs to broken down for further analyzing. In the other experiments the engineer was required to show that $\int_0^1 \frac{x^2+6}{(x^2+4)(x^2+9\ )} = \frac{\pi}{4}$

Task

(a) Help the student to further break the function into partial and hence integrate

(b) Take through the engineer through the steeps of showing the second function

PART II

ITEM SIX

Alvin wishes to close a rectangular piece of land of area 1250 cm^2 whose one side is bound by a straight bank of river. He also wants to effective enhance the water harvesting system at his farm since its is a heavy rainy season by purchasing a closed circular cylinder of base r cm and height h cm with the volume $54\pi cm^3$

Task

(a) Help alvin to find least possible length of barbed wire required

(b) Help alvin show that the total surface area of the cylinder is given by $s = \frac{108\pi}{r} + 2\pi r^2$ and hence find the radius and height which makes the surface area minimum