Name: …… Combination: ……

KITEBI SECONDARY SCHOOL

Uganda Advanced Certificate of Education Beginning of Term I Examinations 2019

PURE MATHEMATICS

Time: 3 hours

INSTRUCTIONS TO CANDIDATES:

- Attempt **all** the eight questions in section **A** and any **five** questions from section **B**.
- Clearly show all the necessary working
- Begin each answer on a fresh sheet of paper
- Silent, simple non-programmable scientific calculators may be used. - Attach the question paper on the answer sheets used

SECTION A (40 MARKS)

1. Solve the simultaneous equations: $2x + y - 2z = 6$ and $\frac{x-2}{3} = \frac{y-2}{4} = \frac{z-2}{5}$.

(05 marks)

2. Solve the equation: $\sin x \cos x = 2\cos x \sin 2$ for $0 \le x \le 180^0$ *(05 marks)*

3. Find the equation of the normal to the curve $x^2y + 3y^2 - 4x - 12 = 0$ at (2, 1)

(05 marks)

4. Find the coefficient of the term containing x^{-8} in the expansion of $(x^2 + \frac{1}{2x^3})^{11}$.

5. Prove that $9^n - 1$ is always a multiple of 8. *(05 marks)*

6. The radius of a sphere increases at a rate of $0.01 cm\ s^{-1}$. Find the rate at which:

i) surface area increases ii) volume increases when the radius is $21cm$

(05 marks)

7. Prove that tan□1□□□ 23 □□□□□ tan□1□□□□ 53 □□□□□□3
(05 marks)

□

8. Differentiate from first principles: $y = \sin x$ *(05 marks)*

SECTION B (60 MARKS)

9. If z □ $\frac{(2-i)(5+12i)}{(1+2i)^2}$

a) Find the:

(i) Modulus of Z; (ii) argument of Z *(08 marks)*

b) Represent Z on a complex plane. *(02 marks)*

c) Write Z in the polar/modulus – argument form. *(02 marks)*

10. Solve for x in the following equations:

a) $9^x - 3^{(x+1)} = 10$,

b) $\log_4 x^2 - 6\log_x^4 - 1 = 0$ *(12 marks)*

11. (a) Find the values of x and θ in the following equations;

(i) □□□cos _12□□sin _12□□□□2□ – for $O^o \leq \theta \leq 360^0$.32
(04 marks)

(ii) tan□1□ □□ □1x □ tan□1□ □□ □□ □13 □□_4 *(05 marks)* □ □

(b) Given that, $t = tan\theta$, simplify ^{t} . *(03 marks)*

$$\sqrt{1 - t^2}$$

12. (a) Find and sketch the locus of $Arg\left(\frac{z}{z - 6 - 4i}\right) = \frac{\pi}{4}$.
(04 marks)

(b) Find the square roots of $-1 - i\sqrt{3}$ *(04 marks)*

(c) Find the locus of the complex number z if $\text{Re}\left(\frac{z^2}{z - 2i}\right) = 0$
(04 marks)

13. a) Use the binomial theorem to show that;

$$\left(\sqrt{1 + 2x} + \sqrt{1 - 4x}\right)^2 = 2 - x - \frac{5}{2}x^2 + \cdots$$ *(07 marks)*

(b) Taking $x = \frac{1}{16}$ use the expansion in (a) above to estimate $\sqrt{6}$ to 2 decimal places. *(05 marks)*

The End

Sine labore Nulla victoria