NAME; …………………………………………………………………

SUBJECT COMB; ………………………………………………….

DATE; …………………………………………………………

SECTION A	
SECTION B	
TOTAL	

P425/1
PURE MATHEMATICS
PAPER 1
EOT 2, 2024
3 hours

Uganda Advanced Certificate of Education

S.5 Pure Mathematics

Paper 1
3 hours

INSTRUCTIONS TO LEARNERS

*Answer **all** question in section **A** and section **B***

***All** working **must** be shown clearly.*

Silent non programmable scientific calculators and mathematical tables with a list of formulae may be used.

Neat work** is a **must

Turn over

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SECTION A (40 MARKS)

1. Solve the equation $3^x + 6(3^{-x}) = 5$. (05 marks)

2. In how many ways different ways can the letters of the word NKOBOZAMBOGO be arranged if;
   (a) there are no restrictions
   (b) O's cannot be together. (05marks)

3. Given that the roots of the equation $x^2 + 6x + c = 0$ differ by 2m. show that $m^2 = 9 - c$ (05marks)

4. Prove that $\tan^{-1}(x) + \cot^{-1}(x) = \frac{\pi}{2}$ (05 marks)

5. Mr. Kazibwe's age and his three children are in a geometric progression, the sum of their ages is 140 years and the sum of the last two children is 14years. Find Mr. kazibwe's age. (05 marks)

6. Prove by induction that $3^{2n+2} - 8n - 9$ is divisible by 64 for all positive integral values of n. (05 marks)

7. Given that $\binom{n}{4} = 5 \binom{n-2}{3}$, find the value of n. (05 marks)

8. Solve for x in $\sqrt{5} \cos x + 2 \sin x$ for x $0 \le x \le 2\pi$ (05 marks)

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SECTION B (60 MARKS)

9. a) The sum of the first m terms of an A.P is n and the sum of the first n terms of the same A.P is m. Show that the sum of the first (m+n) terms is –(m+n).   (05 marks)

   b) The sum of the first terms of an A.P and G.P is 57. The sum of the second terms of the same A.P and G.P is 94. The sum of the third terms of the A.P and G.P is 171. If the common ratio of the G.P is 2. Find the first term of the progression and the common difference of the A.P and the sum of the first 20 terms of the A.P.   (07 marks)

10. a) Prove that $\frac{\sin\theta\cos 2\theta + \sin 3\theta\cos 6\theta}{\sin\theta\sin 2\theta + \sin 3\theta\sin 6\theta} = \cot 5\theta$ (06 marks)

   b) Express $3\sin x + 4\cos x$ in the form $R\sin(x+\alpha)$ where R is positive and α is acute. Hence solve $3\sin x + 4\cos x = 2$ for $0 \le x \le \pi$ (06 marks)

11. a) Find the sum of the even numbers divisible by 3 lying between 400 and 500.   (05 marks)

   b) The expression $6x^3 + 7x^2 + ax + b$ has a remainder of 72 when divided by x-2 and is exactly divisible by x+1. Find the values of a and b. Show that 2x-1 is also a factor of the polynomial and obtain the third factor.
                    (07 marks)

12. a) Determine the term independent of x in the expansion of $\left(2x - \frac{1}{x^2}\right)^{12}$ (05 marks)

   b) Expand $\left(\frac{1+3x}{2-x}\right)^{\frac{1}{2}}$ in ascending powers of x up to x^3 and by taking $x = \frac{1}{5}$, evaluate $\sqrt{8}$. Correct to 3 significant figures.   (07 marks)

13. a) Prove that $\frac{\cos 11° + \sin 11°}{\cos 11° - \sin 11°} = \tan 56°$ (03 marks)

   b) Determine the maximum value of the expression $6\sin x - 3\cos x$.
                    (04 marks)

   c) Solve the equation $\sin x + \sin 5x = \sin 2x + \sin 4x$ for $0° \le x \le 180°$.
                    (05 marks)

END.
SUCCESS BELONGS TO THOSE WHO ARE FOCUSED WITH A VISION

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