

P425/1

PURE MATHEMATICS

PAPER 1

BOT 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

SECTION A

1. Solve for x in $(x^2 + 3x + 2)^2 - 8(x^2 + 3x) - 4 = 0$ (05 marks)
2. Find the equation with integral coefficients whose roots are the cubes of the equation $x^2 - 3x + 4 = 0$ (05 marks)
3. If $x = \sin \theta + \tan \theta$ and $y = \tan \theta - \sin \theta$, show that $(x^2 - y^2)^2 = 6xy$. (05 marks)
4. Solve the equation $(\log_2 x)(\log_4 2x) = 6$. (05 marks)
5. The expression $6x^2 + x + 7$ leaves the same remainder when divided by $x - a$ and $x + 2a$. find the value of a where $a > 0$ (05 marks)
6. Prove that $\tan^{-1} \left(\frac{1}{3} \right) + \tan^{-1} \left(\frac{1}{17} \right) = \cot^{-1} \left(\frac{5}{2} \right)$ (05 marks)
7. Solve the equation $\frac{16^x - 4^x}{4^x + 2^x} = 5(2^x) - 8$ (05 marks)
8. Simplify $\frac{\frac{1}{2}\sqrt{1-x}(1+x)^{\frac{-1}{2}} + \frac{1}{2}(1-x)^{\frac{1}{2}}\sqrt{1+x}}{1-x}$ (05 marks)

SECTION B

9. a) Solve the following simultaneous equation

$$\frac{6}{x-2y} - \frac{15}{x+y} = 0.5$$
$$\frac{12}{x-2y} - \frac{9}{x+y} = -0.4$$

- b) Given that $\log_{16} xy = \frac{7}{2}$ and $\frac{\log_4 x}{\log_4 y} = -8$. Find the value of x and y (12 marks)

10. a) Given that $\frac{1+\sqrt{3}}{(\sqrt{3}-1)^3} = a + b\sqrt{c}$. Find the values of the irrational numbers

a, b and c

- b) Find the square root of $38 - 12\sqrt{2}$ (12 marks)

11. Given that A and B are acute angles with $\sin A = \frac{7}{25}$ and $\cos B = \frac{5}{13}$. Find without using tables or calculators the values of

(i) $\operatorname{cosec}(A + B)$

(ii) $\tan(A + B)$

(iii) $\sec(A + B)$ (12 marks)

12. a) The roots of the equation $2x^2 - 3x + 5 = 0$ are α and β . Find an equation whose roots are $\frac{\alpha}{\beta-2}$ and $\frac{\beta}{\alpha-2}$

- b) Solve the equation $\sqrt{\frac{x-1}{3x+2}} + 2\sqrt{\frac{3x+2}{x-1}} = 3$ (12 marks)

END